Secretariat of the Convention on Biological Diversity

CBD Technical Series No. 59

59

REDD-plus and Biodiversity

CBD

United Nations Decade on Biodiversity

CBD Technical Series No. 59

REDD-plus and Biodiversity

Written and published by the
Secretariat of the Convention on Biological Diversity
Montreal

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 Published 2011
Printed in Canada
ISBN: 92-9225-377-8

This report was drafted by Tim Christophersen and Johannes Stahl.

Local catalogue record:

Secretariat of the Convention on Biological Diversity.
REDD-plus and Biodiversity / Secretariat of the Convention on Biological Diversity... (CBD technical series ; no. 59)
Summary: "This publication provides technical and scientific information for designing and implementing forest-based climate change mitigation actions (REDD-plus) in a way that appropriately considers biodiversity." — Provided by publisher.
ISBN 92-9225-377-8
1. Forest biodiversity 2. Forest biodiversity -- Climatic factors 3. Carbon sequestration 4. Sustainable forestry 5. Forest management -- Environmental aspects 6. Forest management -- Social aspects 7. Climate change mitigation – International cooperation 8. Climate changes -- Environmental aspects 9. Climate changes -- International cooperation
I. Convention on Biological Diversity (1992). II. REDD-plus. II. United Nations.
QH75 .A1 C33 no. 59 2011

Cover photos:
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FOREWORD

Climate change, land degradation and biodiversity are interconnected, not only through effects of climate change on biodiversity and land management, but also through changes in biodiversity and ecosystem functioning that affect climate change. The observed changes in climate have already adversely affected biodiversity at the species and ecosystem level, with further changes in biodiversity being inevitable with further changes in climate. The degradation of many ecosystems is in turn significantly reducing their carbon storage and sequestration capacity, leading to increases in emissions of greenhouse gases.

In the light of this scenario, we can no longer sit idly by: immediate and concerted action to combat climate change and to save biodiversity is required if we are to meet the Millennium Development Goals, maintain essential ecosystem services, and improve the quality of life for the world's poor.

Reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD-plus) may be part of the solution. If well designed and implemented, REDD-plus can decrease emissions of greenhouse gases and provide considerable benefits for biodiversity and livelihoods.

This potential has been recognized by the Parties to the Convention on Biological Diversity (CBD), who invited Parties, other Governments, and relevant international and other organizations to ensure that REDD-plus actions do not run counter to the objectives of the CBD, but support the implementation of the programme of work on forest biodiversity, and provide biodiversity benefits for forests, and, where possible, to indigenous and local communities (Decision IX/5).

I trust that this publication will provide impulses for seizing the opportunities that lie in REDD-plus for combating climate change and saving biodiversity.

I would also like to thank our partners who contributed to the development and review of this publication, including the UN-REDD Programme, Conservation International, the Department for Environment, Food and Rural Affairs (Defra) of the United Kingdom, the Forest Stewardship Council, the Global Canopy Programme, and the University of Freiburg.

Ahmed Djoghlaf
Executive Secretary
Secretariat of the Convention on Biological Diversity

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PREFACE

1. The United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) is encouraging developing country Parties to contribute to greenhouse gas mitigation actions in the forest sector by reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD-plus[1]). COP 16 of the UNFCCC affirmed that the implementation of REDD-plus actions should include the promotion and support of a number of safeguards, including the conservation of biological diversity and that actions complement or are consistent with relevant international conventions and agreements, which includes the Convention on Biological Diversity (CBD).

2. Parties to the CBD have recognized that REDD-plus, if well designed and implemented, can provide considerable benefits for biodiversity. The CBD COP has invited Parties, other Governments, and relevant international and other organizations to ensure that REDD-plus actions do not run counter to the objectives of the CBD, but support the implementation of the programme of work on forest biodiversity, and provide biodiversity benefits for forests, and, where possible, to indigenous and local communities (Decision IX/5). COP has also requested the Executive Secretary of the CBD to provide advice in relation to biodiversity aspects of REDD-plus, for approval by COP 11, based on effective consultation with Parties and their views.

3. At its tenth meeting, the Conference of the Parties to the CBD adopted the Strategic Plan for Biodiversity for 2011 – 2020, that comprises a set of 20 targets to be achieved by 2020. Several of the targets are highly relevant in the context of REDD-plus. Notably, Parties to the CBD have committed themselves to achieve the following targets:

(a) By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced (Target 5 of the Strategic Plan);

(b) By 2020 areas under forestry are managed sustainably, ensuring conservation of biodiversity (Target 7);

(c) By 2020, at least 17 per cent of terrestrial areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved (Target 11);

(d) By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification (Target 15).

4. The CBD Secretariat is undertaking a series of regional workshops in 2011 and 2012, including with the participation of indigenous and local communities, as a means to consult effectively with Parties and obtain their views on the application of relevant safeguards for biodiversity and other aspects of biodiversity within REDD-plus, such as the identification of possible indicators to assess the contribution of REDD-plus to achieving the objectives of the CBD, and to assess potential approaches to monitor impacts on biodiversity from these and other ecosystem-based activities for climate change mitigation. The advice

[1] With reference to decision 1/CP.16 of the United Nations Framework Convention on Climate Change (UNFCCC), REDD-plus comprises reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks in developing countries. The acronyms REDD and REDD-plus are used for convenience only, without any attempt to pre-empt ongoing or future negotiations under the UNFCCC.

on biodiversity aspects of REDD-plus developed on the basis of these workshops and the views received from Parties will be presented to the COP for approval at its eleventh meeting.

5. This document has been prepared by the Secretariat of the CBD, with a view to provide technical and scientific information to Parties in the process of designing and implementing REDD-plus in a way that does not run counter to the objectives of the CBD, but supports the implementation of the programme of work on forest biodiversity (Decision IX/5).

6. More specifically, the document aims to:

(a) Outline the potential benefits of REDD-plus for biodiversity and indigenous and local communities;

(b) Demonstrate the importance of biodiversity and indigenous and local community co-benefits for the long-term success of REDD-plus;

(c) Outline possible risks of REDD-plus for biodiversity and indigenous and local communities, with a view to contributing to the development or improvement of appropriate policy recommendations;

(d) Outline the ways in which the CBD can contribute to the success of REDD-plus, and in turn, outline the potential ways in which REDD-plus can contribute to the objectives of the CBD;

(e) Present various tools for achieving multiple benefits in planning and implementing REDD-plus activities.

7. The document builds, *inter alia,* on the findings of the CBD Ad Hoc Technical Expert Group (AHTEG) on biodiversity and climate change - which was convened in 2008 and produced its final report in October 2009 - and on a global synthesis of the biodiversity/resilience/stability relationship in forest ecosystems, published by the CBD Secretariat in 2009 pursuant to Decision IX/5.

8. It is important to note that the publication of this document, and the other activities of the CBD Secretariat in relation to REDD-plus, is undertaken without any intention of pre-empting any future decisions taken under the United Nations Framework Convention on Climate Change (Decision X/33).

9. This document and other results of the CBD process to develop advice on relevant biodiversity safeguards of REDD-plus, and other information on biodiversity co-benefits of REDD-plus, will be made available to the UNFCCC through appropriate means, including to its Subsidiary Body for Scientific and Technological Advice (SBSTA) in the context of its work on REDD-plus safeguards.

KEY MESSAGES

10. REDD-plus efforts could have both positive and negative impacts on biodiversity and ecosystem services; while in turn, biodiversity plays an important role for effective and long-term carbon storage in forests, depending on species composition and resting on the importance of key functional relationships. It is therefore crucial that biodiversity is appropriately considered in the development and implementation of REDD-plus. The potential to simultaneously address the biodiversity crisis and climate change is unprecedented, while poorly designed REDD-plus efforts could damage forest biodiversity, and in the process threaten the continued provision of ecosystem services for human well-being.

The opportunities for REDD-plus and biodiversity synergies are immense

11. Tropical forests are home to an amazing diversity of life. The Amazon rainforest alone hosts about a quarter of the world's terrestrial species (Malhi et al., 2008). Efforts under the United Nations Framework Convention on Climate Change (UNFCCC) to reduce deforestation and forest degradation could provide considerable benefits for biodiversity, in particular through the conservation of primary forests (SCBD, 2009).[1] In forests that are already degraded, effective forest landscape restoration can also be beneficial for biodiversity. Tropical forests can regain up to 80 per cent of their original biodiversity in as little as 50 years (Dent & Wright, 2009; Sberze et al., 2010).[2] Harnessing the full potential of biodiversity benefits would also boost forest ecosystem services, which have been estimated to be worth on average US$ 6,120 per hectare per year in intact tropical forests (TEEB, 2009b). At the same time, failing to protect sufficiently large areas of intact forests from deforestation and degradation could push certain forest ecosystems past tipping points leading to feedback loops further contributing to increased global temperature and loss of biological diversity (SCBD 2009). At national level there is considerable potential for REDD-plus strategies and National Biodiversity Strategies and Action Plans (NBSAPs) to inform and mutually support one another. However, lack of coordination between relevant government agencies can hamper the achievement of biodiversity benefits of REDD-plus.

Involving indigenous peoples and local communities is key to the success of REDD-plus

12 Strengthened forest governance, including the involvement of indigenous peoples and local communities, will be essential for the success of REDD-plus. It is estimated that more than 300 million indigenous peoples and members of local communities depend mainly on forests for their livelihoods (World Bank, 2004; MEA, 2005), and Indigenous Peoples can be the most effective stewards of forest resources. For example, in the Brazilian Amazon, the average probability of deforestation was found to be 7 to 11 times lower within indigenous lands and other protected areas than in surrounding areas (Ricketts et al., 2010). The full and effective participation of indigenous peoples and local communities are enabling conditions for REDD-plus, as its long-term success will stand or fall with local ownership and support (Agrawal & Angelsen, 2009). The CBD Ad Hoc Technical Expert Group recommends that the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) should be a basis for full and effective participation (SCBD, 2009).

[1] In line with terminology used in the 2010 Global Forest Resources Assessment (FAO 2010), this document uses the terms "primary forest" for naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed; "other naturally regenerated forest" for naturally regenerated forest where there are clearly visible indications of human activities, and "planted forest" (or "plantation") for forest predominantly composed of trees established through planting and/or deliberate seeding. The document uses the term "natural forest" to describe both primary forest and other naturally regenerated forest. The authors recognize that the biodiversity value and other parameters of naturally regenerated forest and of planted forest vary widely.

[2] However, many vulnerable and highly specialized species might not recover from severe forest degradation.

Stable storage of carbon depends on stable and resilient forests

13. There are strong links between biodiversity, ecological processes, and forest carbon stocks, especially at the continental to global scale (Strassburg et al., 2010; Diaz et al., 2009). In forests, the majority of studies suggest that for stands on the same sites, increased plant species richness results in greater productivity and carbon storage than for impoverished stands on the same sites (see summary in Thompson et al., 2009). Carbon fluxes and storage vary greatly among forest types, depending on species composition and age (Bunker et al., 2005; Russell et al., 2010), but there is growing evidence that older primary forests maintain more carbon than younger forests or than most managed forests (Luyssaert et al., 2008; Lewis et al., 2009; Liao et al., 2010). Among the biomes, primary tropical forests are generally the most carbon-dense forests (Lewis et al., 2009), and they are also highly resilient, making it likely that carbon will be stored over long periods of time (i.e., high permanence). Natural high levels of biodiversity in these forests provide insurance through various mechanisms (at genetic, species and landscape scales) (Loreau et al., 2002) that enable these forests to withstand pressure from invasive alien species and other pests, and resist disturbances such as forest fires and storms so that carbon storage can continue over time. A recent synthesis of more than 400 scientific studies on forest resilience concluded that long-term stability of the forest carbon stock against disturbance rests on forest ecosystem resilience, which is conferred by biodiversity at multiple scales (Thompson et al., 2009).

A long-term and holistic approach to spatial planning and analysis is needed for the success of REDD-plus

14. REDD-plus measures need to be planned at the appropriate spatial scale to ensure biodiversity benefits (Thompson et al., 2009). This requires spatial planning at the landscape, regional, or national level, and even in a transboundary context where necessary. Spatial biodiversity data could inform REDD-plus design and planning to improve ecological connectivity in protected areas networks, and to optimize biodiversity benefits and increase permanence. The national ecological gap analyses under the CBD, carried out with stakeholder involvement and based on the best available biodiversity data, provide this information. Early involvement of biodiversity experts at the national and local level, including holders of traditional knowledge, is essential for REDD-plus planning (SCBD, 2009).

Forest restoration ('enhancement of forest carbon stocks') can provide biodiversity benefits

15. Environmentally sensitive restoration of degraded forest and reforestation on agricultural lands can provide both biodiversity and climate benefits (SCBD, 2009). Over the long term, natural succession is generally more effective than tree planting for carbon sequestration (Liao et al., 2010) and generally provides more benefits for biodiversity if the factors that caused forest degradation can be effectively controlled (Sayer et al., 2004). Afforestation and reforestation activities in the context of REDD-plus, if implemented appropriately and in respective areas, could enhance ecological connectivity, which is essential in the context of the adaptation of ecosystems and species to the negative impacts from climate change (SCBD/GIZ, 2011).[3]

Ecological tipping points or thresholds could endanger REDD-plus efforts

16. REDD-plus could be instrumental in safeguarding the Amazon basin and other major tropical forest regions. However, several modelling studies suggest that further destruction of the Amazon rainforest could push much of Amazonia into a permanently drier climate regime, and that such a tipping point becomes more likely with temperature increases of more than 2°C (SCBD, 2010a; Leadley et al., 2010). Large-scale Amazon dieback and other possible major tipping points have to be considered in the context

[3] See the guidance on afforestation and reforestation provided in decision X/33, paragraph 8 (www.cbd.int/decisions), as well as the report of the Ad Hoc Technical Expert Group on Biodiversity and Climate for guidance on the biodiversity aspects of afforestation and reforestation (SCBD 2009).

of overall climate change mitigation efforts, including REDD-plus, as they could reduce the effectiveness of REDD-plus investments and threaten the achievement of mitigation goals.

Key tools to enhance multiple benefits exist, but need further research and development

17. The CBD Secretariat has developed, through its LifeWeb Initiative and jointly with UNEP-WCMC, an online carbon and biodiversity mapping tool, which could help to inform decision-makers about synergies between carbon and biodiversity (www.carbon-biodiversity.net). This tool is presently being further developed to include the national ecological gap analyses carried out under the CBD, which have been completed or are in the process of being completed in many developing countries. With regard to the monitoring of biodiversity benefits, a joint initiative of the Collaborative Partnership on Forests (CPF) to monitor forest degradation, and other initiatives in which the CBD Secretariat is involved, can contribute to measuring the success of REDD-plus and its multiple benefits.[4] Another key tool developed by the CBD is the ecosystem approach, a planning framework for conservation and sustainable use of biodiversity which is designed specifically to capture multiple benefits in the form of ecosystem services.[5] However, the challenge in many countries, and at the regional and international level, is to make this information available, at the right time and in the appropriate format, to the relevant institutions and individuals involved in the design and planning of REDD-plus efforts.

There are potential risks of REDD-plus on biodiversity that can be overcome

18. Potential risks for biodiversity of poorly designed REDD-plus efforts include (UNEP/CBD/WS-REDD/1/3):

(a) The conversion of natural forests to plantations and other land uses of low biodiversity value; and the introduction of growing of biofuel crops;

(b) The displacement of deforestation and forest degradation to areas of lower carbon value and high biodiversity value;

(c) Increased pressure on non-forest ecosystems with high biodiversity value; and

(d) Afforestation in areas of high biodiversity value.

19. Specific risks of REDD-plus for indigenous peoples and local communities include (UNEP/CBD/WS-REDD/1/3):

(a) Loss of traditional territories and restriction of land and natural resource rights;

(b) Lack of tangible livelihood benefits to indigenous peoples and local communities and lack of equitable benefit sharing;

(c) Exclusion from designing and implementation of policies and measures; and

(d) Loss of traditional ecological knowledge.

20. These risks can be mitigated (i) through appropriate implementation and monitoring of the application of safeguards as outlined in UNFCCC COP decision 1/CP.16, including by ensuring that conversion of natural forests is avoided, and by ensuring full and effective participation of indigenous peoples and

[4] Results of the CPF initiative will be submitted for possible integration into the Global Forest Resources Assessment 2015, and other relevant forest and biodiversity monitoring tools, as appropriate.

[5] For operational guidance on the ecosystem approach, please see http://www.cbd.int/ecosystem/operational.shtml.

local communities based on the United Nations Declaration on the Rights of Indigenous Peoples; (ii) by ensuring that REDD-plus follows a comprehensive approach to forest-based carbon storage; (iii) by setting appropriate baselines and reference scenarios; and (iv) by monitoring biodiversity impacts of REDD-plus efforts, for example, in the context of reporting under CBD.[6]

[6] In the context of baselines and monitoring, the question of whether to use gross or net deforestation rates is particularly important. The use of net rates could hide the loss of natural and modified natural forests and their replacement in situ or elsewhere with plantations. Such conversions to plantations have negative impacts on biodiversity and should therefore be excluded from any REDD-plus or other climate-change funding (UNEP/CBD/WS-REDD/1/3 at www.cbd.int). Net deforestation (net loss of forest area) is defined in the FAO Global Forest Resources Assessment 2010 as overall loss of forests area minus changes in forest area due to forest planting, landscape restoration and natural expansion of forests.

1. INTRODUCTION

21. REDD-plus[1] is being developed first and foremost as a climate change mitigation option, but it is also expected to generate considerable biodiversity benefits and ecosystem services, and has the potential to generate benefits for indigenous and local communities. Achieving and optimizing these so called "co-benefits" (or additional or multiple benefits) will require close coordination between actors at local, national and international levels.

1.1 The state of play in the REDD-plus negotiations under the UNFCCC

22. The issue of reducing emissions from deforestation was first introduced into the negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) by Papua New Guinea and Costa Rica at the eleventh session of the Conference of the Parties (COP) to the UNFCCC in Montreal in 2005. At UNFCCC COP 13, held in December 2007 in Bali, "reducing emissions from deforestation and forest degradation; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" became part of the "Bali Action Plan". In 2008 and 2009, policy approaches and positive incentives relating to this issue were considered in the negotiations under the Bali Action Plan.

23. At its sixteenth session in Cancun, the UNFCCC COP adopted Decision 1/CP.16, which made a series of recommendations including encouraging developing country Parties to contribute to greenhouse gas mitigation actions in the forest sector by undertaking REDD-plus activities. Under this decision the implementation of REDD-plus will take place in three different phases, starting with (i) *"the development of national strategies or action plans, policies and measures, and capacity-building*" followed by (ii) "*the implementation of national policies and measures and national strategies or action plans that could involve further capacity-building, technology development and transfer and results-based demonstration activities"* and evolving into (iii) *"results-based actions that should be fully measured, reported and verified."* [2]

24. In Appendix I of decision 1/CP.16, the Conference of the Parties to the UNFCCC elaborates on guidelines and safeguards for policy approaches and positive incentives on issues relating to REDD-plus. Paragraph 1 of the Appendix specifies that REDD-plus activities should:

(a) Contribute to the achievement of the objective set out in Article 2 of the UNFCCC

(b) Contribute to the fulfilment of the commitments set out in Article 4, paragraph 3, of the UNFCCC;

(c) Be country-driven and be considered options available to Parties;

(d) Be consistent with the objective of environmental integrity and take into account the multiple functions of forests and other ecosystems;

(e) Be undertaken in accordance with national development priorities, objectives and circumstances and capabilities and should respect sovereignty;

(f) Be consistent with Parties' national sustainable development needs and goals:

[1] REDD-plus is the short hand used to describe reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks in developing countries (decision 1/CP.16 of the United Nations Framework Convention on Climate Change).

[2] Financing options for the implementation of results-based REDD-plus actions will be explored, and progress will be reported to UNFCCC COP 17 in 2011.

(g) Be implemented in the context of sustainable development and reducing poverty, while responding to climate change;

(h) Be consistent with the adaptation needs of the country;

(i) Be supported by adequate and predictable financial and technology support, including support for capacity-building;

(j) Be results-based;

(k) Promote sustainable management of forests;

25. In paragraph 2 of Appendix I, the Conference of the Parties to the UNFCCC further affirms that the implementation of REDD-plus activities should include the promotion and support of a number of safeguards, including:

(a) That actions complement or are consistent with the objectives of national forest programmes and relevant international agreements;

(b) Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;

(c) The full and effective participation of relevant stakeholders, in particular, indigenous peoples and local communities;

(d) That actions are consistent with the conservation of natural forests and biological diversity, ensuring that they are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forest and their ecosystem services, and to enhance other social and environmental benefits;

(e) Actions to address the risk of reversals;

(f) Actions to reduce the displacement of emissions.

26. The Conference of the Parties to the UNFCCC further requests that developing country Parties aiming to undertake REDD-plus activities, develop

(a) A national REDD-plus strategy or action plan;

(b) A national forest reference emission level and/or forest reference level;

(c) A robust and transparent national forest monitoring system; and

(d) A system for providing information on how the safeguards are being addressed and respected throughout the implementation of REDD-plus activities.

27. For the first phase of implementation, the COP requested developing country Parties aiming to undertake REDD-plus activities, to develop (i) a national strategy or action plan; (ii) a national forest reference emission level and/or forest reference level or, under certain circumstances as an interim measure subnational forest reference emission levels and/or forest reference levels; (iii) a national forest monitoring

system; and (iv) a system for providing information on how the safeguards are being addressed and respected throughout the implementation of REDD-plus activities. Furthermore, the Conference of the Parties to the UNFCCC invited relevant international organizations and stakeholders to contribute to REDD-plus activities.

28. The COP requested that the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) develop a work programme that would include guidance on the system that provides information on how the safeguards are being addressed and respected throughout the implementation of REDD-plus activities. The COP will consider this guidance at its seventeenth session.

1.2 REDD-plus related discussions and activities outside of the UNFCCC

29. Discussions and activities on REDD-plus are also taking place in parallel with the UNFCCC process. Since the Bali session of the UNFCCC COP, various pilot and demonstration activities have started, notably with funding from the World Bank's Forest Carbon Partnership Facility (FCPF) and Forest Investment Programme (FIP), the United Nations REDD Programme (UN-REDD), the Global Environment Facility (GEF), the International Tropical Timber Organization (ITTO), and the REDD-plus Partnership (see Table 1).

30. The World Bank's FCPF consists of two separate mechanisms, the Readiness Mechanism and the Carbon Finance Mechanism, each with its own trust fund for which the World Bank acts as Trustee. The Readiness Mechanism is assisting 37 tropical and sub-tropical developing countries prepare for future participation in a large-scale system of positive incentives for REDD-plus. This includes preparing a national REDD-plus strategy and/or complementing the country's existing strategy, establishing a reference scenario against which countries will reduce emissions, and establishing a national monitoring, reporting and verification system for emissions and emission reductions. A few countries that will have successfully participated in the Readiness Mechanism may be selected on a voluntary basis to participate in the Carbon Finance Mechanism through which the FCPF will pilot incentive payments for REDD-plus policies and measures in approximately five developing countries. In addition to the Readiness and Carbon funds, the World Bank set up the Forest Investment Programme (FIP), which provides support to investments needed for the delivery of benefits from REDD-plus. Relevant operational guidance of the FCPF in relation to biodiversity and indigenous and local communities, including World Bank environmental safeguards, is available at http://web.worldbank.org.

31. The UN-REDD Programme was launched in September 2008 jointly by the Food and Agriculture Organization (FAO), the United Nations Development Programme (UNDP), and the United Nations Environment Programme (UNEP), building on agency-specific comparative strengths. UN-REDD actions serve the double purpose of assisting developing countries to prepare and implement national REDD-plus strategies and, at the global level, helping develop analyses and guidelines on issues such as measurement, reporting and verification of carbon emissions; ensuring that forests continue to provide multiple benefits for livelihoods and the environment; and supporting the engagement of indigenous peoples and civil society. Currently, the UN-REDD Programme is funding thirteen pilot countries, and has welcomed sixteen others to be observers and potential future pilot countries. Operational guidance for the UN REDD Programme in relation to biodiversity benefits and indigenous and local communities is available at www.un-redd.org.

32. The GEF first launched a pilot REDD incentive scheme in 2007. Currently, funding for sustainable forest management (SFM) and REDD-plus is mainly being provided through individual country allocations for biodiversity, climate change and land degradation. Developing countries eligible for GEF funding for SFM are those with forests capable of delivering benefits for biodiversity, mitigation of greenhouse gas emissions and local livelihoods. For the current funding cycle, 2010-2014 (GEF-5), the GEF provides incentives for countries to generate multiple environmental and social benefits deriving from SFM and

REDD-plus projects. Accordingly, the overall goal of the GEF-5 SFM/REDD-plus strategy is to achieve multiple environmental benefits from improved management of all types of forests (GEF 2010).

33. ITTO's Thematic Programme on Reduced Deforestation and Forest Degradation and Enhancing Environmental Services in Tropical Forests (REDDES) is set up complementary to the REDD-plus initiatives mentioned above. REDDES follows a comprehensive approach covering all environmental services. It is focused on strengthening sustainable forest management (SFM) in REDD-plus, particularly with regards to forest degradation. It also concentrates on capacity-building, particularly with regards to local implementation of REDD-plus, and on REDD-plus demonstration activities. REDDES covers all ITTO member countries (including countries not covered by other initiatives).

34. The CBD, World Bank, GEF, ITTO, and the organizations constituting the UN-REDD Programme, collaborate with other relevant organizations in the Collaborative Partnership on Forests (CPF), a voluntary arrangement among 14 international organizations and secretariats with substantial programmes on forests. The CPF's mission is to promote the management, conservation and sustainable development of all types of forests and to strengthen long term political commitment to this end. CPF members closely collaborate on REDD-plus policy.

35. In addition to the programmes of the World Bank, UN-REDD, GEF and ITTO, an initiative led by France and Norway resulted in the creation of an interim political partnership among countries to formalize areas of agreement on REDD-plus. The REDD-plus Partnership focuses on "fast track" financing of REDD-plus actions to supplement the UNFCCC negotiation track. It also aims at sharing information and creating transparency about REDD-plus activities and scaling up financing. The partnership's pilot activities and interim arrangements will not set the rules for REDD-plus, but they provide lessons learned and precedents that feed into the negotiations.

Table 1: REDD-plus pilot and demonstration countries

Country	FCPF	FIP	UN- REDD	ITTO REDDES	Total area of forests (1000 ha)	% of forest cover
Argentina	X		X*		29400	11
Bangladesh			X*		1142	11
Bhutan			X*		3249	69
Bolivia	X		X	X	57196	53
Brazil		X		X	519522	62
Burkina Faso		X			5649	21
Cambodia	X		X	X	10094	57
Cameroon	X			X	19916	42
Central African Republic	X		X*	X	22605	36
Chile	X				16231	22
Colombia	X		X*	X	60499	55
Congo, Democratic Republic of	X	X	X	X	154135	68
Congo, Republic of	X		X*	X	22411	66
Costa Rica	X		X*		2605	51
Cote d'Ivoire				X	10403	33
Ecuador			X	X	9865	36
El Salvador	X				287	14
Equatorial Guinea	X				1626	58
Ethiopia	X				12296	11
Fiji				X	1014	56

Country	FCPF	FIP	UN- REDD	ITTO REDDES	Total area of forests (1000 ha)	% of forest cover
Gabon	X		X*	X	22000	85
Ghana	X	X		X	4940	22
Guatemala	X		X*	X	3657	34
Guyana	X		X*	X	15205	77
Honduras	X			X	5192	46
India				X	68434	23
Indonesia	X	X	X	X	94432	52
Kenya	X		X*		3467	6
Lao PDR	X	X			5666	47
Liberia	X			X	4329	45
Madagascar	X				12553	22
Malaysia				X	20456	62
Mexico	X	X	X*	X	64802	33
Mozambique	X				39022	50
Myanmar				X	31773	48
Nepal	X		X*		3636	25
Nicaragua	X				3114	26
Nigeria			X*	X	9041	10
Panama	X		X	X	3251	44
Papua New Guinea	X		X	X	28726	63
Paraguay	X		X		17582	44
Philippines			X	X	7665	26
Peru	X	X			67992	53
Solomon Islands			X		2213	79
Sri Lanka			X*		1860	29
Sudan			X*		69949	29
Suriname	X			X	14758	95
Tanzania	X		X		33428	38
Thailand	X			X	18972	37
Togo				X	287	5
Trinidad & Tobago				X	226	44
Uganda	X				2988	15
Vanuatu	X			X	440	36
Venezuela				X	46275	52
Vietnam	X		X		13797	44
Zambia			X		49468	67

* UN REDD observer countries

Sources: FCPF, FIP, UN-REDD, ITTO, Global Forest Resources Assessment 2010

1.3 CBD decisions with regard to REDD-plus

36. It is now widely recognized that biodiversity and climate change are inextricably linked, not only because of the current and expected future impacts of inevitable climate change on biodiversity, but also because of biodiversity's essential role in climate change mitigation and climate change adaptation (SCBD, 2009; UN General Assembly Resolution 64/203 of 14 December 2009).

37. The nature and extent of the impacts of REDD-plus on forest biodiversity, and on indigenous and local communities, will be determined by the design of the REDD-plus mechanism and by the implementation of REDD-plus efforts at national and local levels (SCBD, 2009; Harvey and Dickson, 2009).

38. At its ninth meeting, the Conference of the Parties to the CBD welcomed the consideration of the issue of reducing emissions from deforestation and forest degradation in the framework of the UNFCCC (decision IX/16).

39. Further, in Decision IX/5, the CBD COP invited Parties, other Governments, and relevant international and other organizations to

> ensure that possible actions for reducing emissions from deforestation and forest degradation do not run counter to the objectives of the Convention on Biological Diversity and the implementation of the programme of work on forest biodiversity; but support the implementation of the

Expanded programme of work on forest biological diversity

The CBD's expanded programme of work on forest biological diversity (Decision VI/22, annex) consists of 130 measures, which the Parties have agreed to implement in accordance with national priorities. Implementation of these measures could contribute significantly to the success of REDD-plus, for example, measures to control forest fires, and measures to improve forest governance and promote sustainable forest management.

The measures are clustered in three elements:

- Element 1 relates to measures for the conservation and sustainable use of forest resources and the equitable sharing of the multiple benefits arising from their use. The measures include activities to increase sustainable forest management, implement the ecosystem approach, establish effective protected areas, restore degraded forests, fight against forest fires and invasive alien species, and ensure equitable access and benefit-sharing with indigenous and local communities.
- Element 2 involves measures to further develop the institutional and socio-economic environment necessary to enable forest conservation, sustainable use and benefit-sharing. Measures in this cluster include activities to provide incentives for the use of sustainable practices (e.g., certification), to develop good practices in forest law enforcement and governance (FLEG), and to clarify land tenure and resource rights.
- Element 3 concerns scientific and technical measures for better knowledge, assessment and monitoring of forest trends. These measures include activities to advance assessment methods, research forest ecosystem functioning, develop a global forest classification system, and improve the infrastructure for data and information management.

The complete expanded programme of work on forest biological diversity, as adopted in the annex to CBD decision VI/22, can be downloaded at http://www.cbd.int/forest/pow.shtml

> programme of work, and provide benefits for forest biodiversity, and, where possible, to indigenous and local communities, and involve biodiversity experts including holders of traditional forest-related knowledge, and respect the rights of indigenous and local communities in accordance with national laws and applicable international obligations (para. 2 (c)).

40. The Conference of the Parties to the CBD requested the Executive Secretary, in Decision IX/5, to "support Parties' efforts to address reducing emissions from deforestation and forest degradation in developing countries, in collaboration with CPF members, in particular with the World Bank and the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC)." In the same decision, the Conference of the Parties further requested the Executive Secretary to carry out thematic and/or regional workshops to support Parties' efforts in implementing the programme of work on forest biodiversity, based on the findings of the in-depth review of the programme of work (UNEP/CBD/SBSTTA/13/3) in close collaboration with members of the CPF.[3]

41. Furthermore, in decision IX/16, COP "Invites the United Nations Framework Convention on Climate Change to take full account of opportunities for its work to provide benefits for biodiversity, including through collaboration among the subsidiary bodies of the three Rio conventions and the application of the ecosystem approach and sustainable forest management" (para. 11 (b)).

42. On the basis of decision IX/16, the CBD Ad Hoc Expert Group (AHTEG) on biodiversity and climate change developed basic recommendations to support Parties in their efforts to implement REDD-plus in a way that is supportive of CBD provisions. The AHTEG guidance (SCBD, 2009) is reflected in the following chapters and the full set of recommendations relevant to REDD-plus is provided in annex II.

43. Key aspects of the AHTEG recommendations are reflected in CBD COP 10 decisions. In decision X/33, CBD COP 10 invited Parties, other Governments, and relevant organizations and processes to

> enhance the benefits for, and avoid negative impacts on, biodiversity from reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries, and other sustainable land management and biodiversity conservation and sustainable use activities, taking into account the need to ensure the full and effective participation of indigenous and local communities in relevant policy-making and implementation processes, where appropriate; and to consider land ownership and land tenure, in accordance with national legislation (para. 8 (q)).

44. In the same decision, CBD COP 10 requested the Executive Secretary to

> provide advice, for approval by the Conference of the Parties at its eleventh meeting, including on the application of relevant safeguards for biodiversity, without pre-empting any future decisions taken under the United Nations Framework Convention on Climate Change, based on effective consultation with Parties and their views, and with the participation of indigenous and local communities, so that actions are consistent with the objectives of the Convention on Biological Diversity and avoid negative impacts on and enhance benefits for biodiversity (para. 9 (g)).

45. Furthermore, CBD COP 10 requested the Executive Secretary to

> identify possible indicators to assess the contribution of reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries to achieving the objectives of the Convention

[3] Relevant joint activities of the CPF include an initiative to improve the definition and monitoring of forest degradation, led by FAO. The initiative is expected to report results in time for UNFCCC COP 17.

For more information, see http://www.fao.org/forestry/cpf/forestdegradation/en/.

on Biological Diversity, and assess potential mechanisms to monitor impacts on biodiversity from these and other ecosystem-based approaches for climate change mitigation measures, without pre-empting any future decisions taken under the United Nations Framework Convention on Climate Change, and to report on progress to the Subsidiary Body on Scientific, Technical and Technological Advice at a meeting prior to the eleventh meeting of the Conference of the Parties (para. 9 (h)).

Strategic Plan for Biodiversity 2011-2020

The Conference of the Parties to CBD, at its tenth meeting, adopted a new Strategic Plan for the Convention for the period 2011 to 2020 (Decision X/2). Several targets of the Strategic Plan are directly linked to REDD-plus, in the sense that the success or failure of REDD-plus could determine the feasibility of achieving these targets. In turn, implementation of the CBD could support the success of REDD-plus. It seems advisable, therefore, to align forest-related targets of both Conventions, and to collaborate closely to achieve synergies.

The 2020 targets of the draft Strategic Plan directly related to forest biodiversity are:

Strategic goal B. Reduce the direct pressures on biodiversity and promote sustainable use

***Target 5*:** By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

***Target 7*:** By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

***Target 11*:** By 2020, at least 17 per cent of terrestrial and inland water areas, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.

***Target 15*:** By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

The time period for the Strategic Plan coincides with the United Nations Decade on Biodiversity.

The full text of the Strategic Plan (Decision X/2) is available at: http://www.cbd.int/decision/cop/?id=12268

PART I: RISKS IN THE REDD-PLUS CONTEXT

46. Risks and opportunities for implementing REDD-plus will vary across different landscape contexts. Three broad types of landscape contexts can be identified, and a mixture of forest-related and agricultural options may be applicable in each of the following landscapes (SCBD, 2009):

(a) In forest landscapes subject to ongoing clearing and forest degradation, climate change mitigation and biodiversity conservation can be achieved by reducing deforestation and forest degradation and improving sustainable management of forests.

(b) In forest landscapes that currently have little deforestation or forest degradation occurring, especially those forest close to the forest frontier, the conservation of remaining primary forests is critical both for protecting carbon stocks and preventing future greenhouse emissions, as well as for conserving biodiversity.

(c) In forest landscapes that have already been largely cleared and degraded, climate change mitigation and biodiversity conservation can be achieved by enhancing carbon stocks through restoration and improved sustainable management of forests, rebuilding carbon stocks of biomass and forest soils (e.g., restoration and rehabilitation), as well as improving agricultural management, including agro-forestry.

47. Risks and opportunities of REDD-plus will thus strongly depend on the current and historical land use and in general the local, national, and regional socio-economic and policy context. The following sections provide a broad overview of risks of REDD-plus for biodiversity, without pretending to be exhaustive.

2. Risks from REDD-plus

2.1 Risks to biodiversity

2.1.1 Conversion of natural forests

48. One frequently discussed risk to biodiversity from REDD-plus is the possible creation of perverse incentives that would undermine biodiversity objectives, notably by subsidizing or otherwise facilitating the conversion of primary or other naturally regenerated forests ("natural forests") into plantations. The implementation of REDD-plus activities should therefore not include the conversion of natural forests, but should incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits (UNFCCC COP decision 1/CP.16).

49. Forest plantations are generally much poorer in biodiversity than natural forests and often do not provide comparable local socio-economic benefits. In many cases they have undermined the rights, cultural identity and livelihoods of indigenous and local communities (Colchester, 2010). Forest conversion could theoretically occur directly because of REDD-plus efforts or indirectly through leakage (see section below), if safeguards are not appropriately implemented.

Forest plantations are generally poorer in biodiversity than natural forests.

PHOTO: JOHN FOXX/STOCKBYTE/THINKSTOCK

50. A recent scientific synthesis of 86 peer-reviewed studies concluded that any conversion

of natural forests to plantations creates a significant 'carbon debt' through carbon dioxide emissions, and that plantations sequester and store on average 28% less carbon than natural forests (Liao et al., 2010). Therefore, not only from a biodiversity, but also from a climate change mitigation and biodiversity perspective, the conversion of natural forests should be excluded from any REDD-plus efforts and related incentive measures, as well as from any climate change adaptation efforts (SCBD, 2009).

51. The threat of forest conversion to biodiversity has recently been reviewed in South-East Asia, using the example of conversion of primary or other naturally regenerated forests to oil palm plantations. Globally, oil palm plantations increased from 3.6 million ha in 1961 to 13.2 million ha in 2006, and Indonesia and Malaysia are today the world's largest palm oil producers, with 4.1 million hectares and 3.6 million hectares, respectively, under cultivation (FAO, 2007). Palm oil is now being produced in 43 countries, and production is expected to further increase substantially in coming decades (Danielsen et al., 2009; SCBD, 2008b). A recent analysis by Koh & Wilcove (2010) of conversion to palm oil plantations in Indonesia and Malaysia, based on land-cover data compiled by the FAO, indicates that during the period 1990–2005, 55%–59% of oil palm expansion in Malaysia, and at least 56% in Indonesia, occurred at the expense of forests. The analysis also found that the conversion of either primary or other naturally regenerated forests to oil palm plantations may result in significant biodiversity losses.

52. The risk of natural forest conversion could increase if only net (rather than gross) deforestation is at the basis of REDD-plus calculations.[1] The use of net instead of gross deforestation rates obscures the loss of mature (i.e., primary and modified natural) forests by their replacement *in situ* or elsewhere with areas of new forest growth. This could be accompanied by significant losses of biodiversity as well as unrecorded emissions (SCBD, 2009).

53. One important argument against conversions of natural forests to plantations for climate change mitigation or adaptation purposes, and against the consideration of plantations in REDD-plus efforts, is the greater risks regarding the permanence of carbon in plantations and other forests with lower resilience or resistance, as compared to primary forests or other diverse forests (see section 3.1 below).

2.1.2 Leakage (displacement of emissions)

54. Leakage in the context of REDD-plus describes the displacement of emissions from deforestation or forest degradation from one forest area to another, or to another ecosystem. REDD-plus activities should promote and support actions to reduce leakage (UNFCCC COP decision 1/CP.16).

55. Leakage can result when one forest area under REDD-plus is effectively conserved and emissions are reduced, but the pressure to convert or degrade the forest simply moves on to other areas, either forests or other ecosystems such as wetlands or grasslands, and either in the same country, or in a different country. In each case, the emissions would simply be displaced, and no significant reduction (or co-benefits) would occur. In many cases that are prone to leakage, the pressure results from demand for commodities such as palm oil, timber and food crops, and this pressure is expected to increase significantly over coming decades (SCBD, 2008b). Figure 1 illustrates the leakage challenge in relation to REDD-plus.

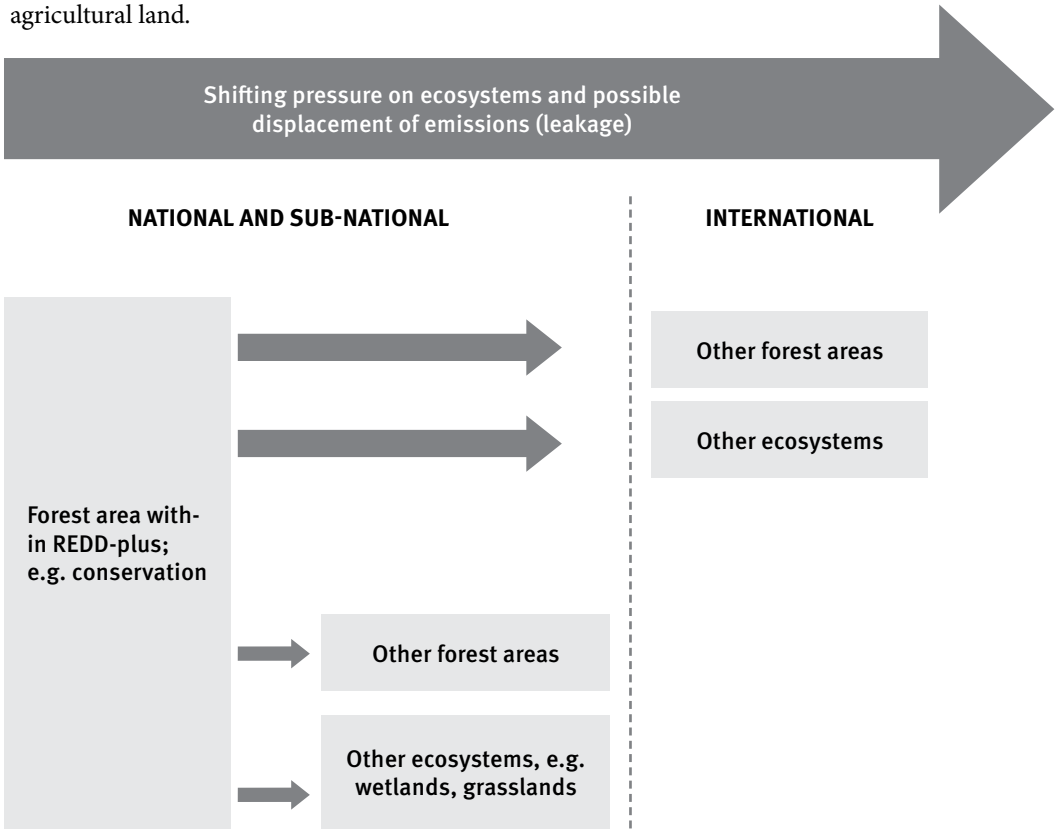
56. Key challenges for the success of REDD-plus are therefore (i) creating a mechanism that is inclusive enough to prevent leakage (at project, national and international levels); (ii) establishing and running a monitoring and reporting framework that allows for detecting leakage and lead to a continuous improvement of REDD-plus approaches; and (iii) ensuring that enough goods and services, such as timber and food, are produced in a way that does not require forest conversion. The success of REDD-plus is thus closely linked to an increase in agricultural productivity and to the restoration of degraded lands, but also

[1] Net deforestation (net loss of forest area) is defined in the FAO Global Forest Resources Assessment 2005 as overall deforestation minus changes in forest area due to forest planting, landscape restoration and natural expansion of forests.

FIGURE 1

Leakage

Leakage (displacement of emissions) in REDD-plus can be caused by the displacement of land use pressure to other forests and ecosystems, e.g. the pressure to convert natural ecosystems to agricultural land.



to the sufficient supply of timber from production forests that are not necessarily included in REDD-plus efforts, including plantations.

2.1.3 Biodiversity risks from afforestation and reforestation activities[2] *(enhancement of forest carbon stocks)*

57. The AHTEG on biodiversity and climate change noted that afforestation activities can have positive or negative effects on biodiversity and ecosystem services depending on their design, the way they are managed, and how the land is presently used. Afforestation activities that convert non-forested landscapes with high biodiversity values and/or valuable ecosystem services increase threats to native biodiversity.

58. Afforestation activities could help to conserve biodiversity if they, for example, convert only degraded land or ecosystems largely composed of exotic species, include native tree species, consider the invasiveness of non-native species (as well as the risk posed by the associate species that sometimes travel with them, such as insects, pathogens, weeds) and are strategically located within the landscape to enhance connectivity (SCBD, 2009).

[2] In the context of land use, land-use change and forestry (LULUCF) under the UNFCCC Kyoto Protocol, "afforestation" is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources; and "reforestation" is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989; (decision 11/CP.7)

59. Reforestation can provide both biodiversity and climate change mitigation benefits if it uses an appropriate mix of native species, incorporates any natural forest remnants, and results in a permanent, semi-natural forest. If appropriately designed and managed, reforestation activities on degraded lands can also relieve pressure on natural forests by supplying alternative sources of sustainable wood products to local communities, thereby providing additional biodiversity and climate change mitigation benefits. Increasing the extent of tree plantations has often been proposed as both mitigation and adaptation measure (SCBD, 2009).

60. However, a recent synthesis of 86 studies has questioned the climate change mitigation value of plantations, and of afforestation and reforestation (Liao et al., 2010). Furthermore, forest plantations for carbon storage are usually established using genetically uniform stock with high growth rates, but low adaptive capacity, which will ultimately diminish their performance in mitigation.[3]

61. The establishment of plantations can result under certain circumstances, i.e. on deforested and/or severely degraded agricultural land, in net biodiversity benefits and increase the supply and quality of ecosystem services – if properly planned and implemented (Sayer et al., 2004; Brockerhoff et al., 2008; SCBD, 2009).

2.2 Risks to indigenous and local communities in the REDD-plus context

62. It is estimated that more than 300 million indigenous peoples and members of local communities depend mainly on forests for their livelihoods (World Bank 2004; MEA, 2005). REDD-plus carries a number of risks for indigenous and local communities. The anticipated risks in this context include that by monetizing forest carbon, REDD-plus might substantially increase the financial value of forests and could therefore trigger a "land grab" by governments and private investors, which could take forests from indigenous and local communities. As in the case of the well-documented land grab in agriculture (Daniel & Mittal, 2009; World Bank, 2010; Zak et al., 2008), loss of forest access would undermine local livelihoods and could lead to evictions of local forest users. It could also mean the removal of tenure reform from the policy agenda.

63. In addition, REDD-plus poses risks to indigenous and local communities which revolve around the issue of efficiency versus equity. In the interest of efficiency, to meet its additionality requirements, and at the expense of equity considerations, REDD-plus may give priority to the conservation of forests which would not otherwise be conserved. If designed in this way, REDD-plus would discriminate against indigenous and local communities who have already conserved forests or taken early action to do so (Kanninen et al., 2007).

64. Finally, there is a risk that REDD-plus could interrupt the promising trend towards decentralized forest management (Phelps et al., 2010). Effective decentralization policies allow indigenous and local communities increased rights and responsibilities, and help protect forests in many regions (Ribot et al., 2006). A recent study of 80 forest commons across 10 countries indicates that decentralized resource management is correlated with higher livelihood benefits and greater forest carbon storage (Chhatre & Agrawal, 2009). By substantially increasing the market value of forests, REDD-plus could provide new incentives to central governments to "re-centralize" control over forests. This would end autonomous decision-making about forest use at the local level and could involve the imposition of excessive control over indigenous and local communities. It could also lead to the displacement of local forest users, as recorded for some national parks (Schmidt-Soltau, 2009).

[3] For example, the largest monoculture plantation of Caribbean Pine (*Pinus caribaea var hondurensis*) in the American tropics suffered a large-scale tree mortality as a result of water stress during the 1997 El Niño event (Cedeño et al., 2001). Increasing both genetic and species diversity in managed forest stands is likely to be important to increase forest resilience and resistance, and can be obtained by selecting a mix of species and range of age structures, including those that are likely to be adaptable to future climate conditions (SCBD, 2009). If non-native species are used, the potential risks that they become invasive species as well as possible risks (e.g. impacts on other ecosystems through effects on water tables) should be considered.

2.3 Risks to the flow of ecosystem services

65. Forests provide a wide range of ecosystem services that operate at different spatial and temporal levels. These include supporting, provisioning, cultural and regulating services (MEA 2005). Estimated by the TEEB study, intact tropical forests provide ecosystem services worth $US 6,120 per hectare per year on average (across 109 compared studies, while the maximum value calculated was $US 16,362, TEEB, 2009b). However, as noted by TEEB and other recent studies, the value of the ecosystem services is often inadequately reflected in economic accounting and decision-making (TEEB, 2009b).

66. Poor design and implementation of REDD-plus could result in substantial opportunity costs through lost ecosystem services. For example, if forests as part of REDD-plus are only managed for carbon (that, in primary and other naturally regenerated forests is mostly in woody biomass and in the soil), it could lead to the loss of important non-timber forest products, such as fruit, wildlife, fungi, and others. On the other hand, REDDplus efforts that focus on and prioritize diverse forests could contribute to the flow of ecosystem services associated with these forests.

2.4 Risk of increasing land rents and rising food prices

67. Lack of integration of REDD-plus into broader agricultural policy could also lead to increasing land rents and rising food prices. If successfully implemented, REDD-plus will lead to opportunity cost changes for deforestation, so that less agricultural conversions of existing forests can be expected. At the same time, increasing demand for agriculture and forestry products exceeds the supply from land not protected under REDD-plus, a price increase of those products, and consequently rising food prices, is likely (Huettner, 2010).

Poor design and implementation of REDD-plus could result in loss of ecosystem services such as the provisioning of important NTFPs.

68. In light of these risks, it seems advisable to address the challenges for sustainable land-use coherently, at least at a landscape level, in particular the challenge of improving agricultural yields in a way that does not require large-scale conversion of forests.

3. Risks to REDD-plus

3.1 Risks to REDD-plus permanence from lack of resilience

69. There is a strong correlation between species richness and forest carbon stock at a global scale (Strassburg et al., 2010). Primary tropical forests are generally the most carbon-dense forests, are highly resistant to change and are resilient, making it more likely that carbon will be stored over long periods of time (permanence) compared to secondary forests. A recent synthesis of more than 400 scientific studies on forest resilience concluded that long-term stability of forest carbon stocks against disturbance rests on forest ecosystem resilience, which in turn rests on the roles played by biodiversity at all scales (Thompson et al., 2009). This has important implications for REDD-plus design and implementation, as it indicates that carbon permanence will, in large part, be determined by the biotic composition and functional relationships in the forests that are part of REDD-plus efforts. In other words, the more biologically diverse a forest landscape is, the more resilient it will be to large-scale drastic change (Loreau et al., 2002), and the

PHOTO: G. ULUTUNCOK

more secure will be the carbon it stores. However, this relationship holds true only to certain thresholds or tipping points (see 'Forest Resilience, Biodiversity, and REDD-plus' below). There is a great deal of uncertainty related to what degree of environmental change it would take for ecosystems to pass such tipping points (SCBD, 2010a).

3.2 Risks to REDD-plus from ecological tipping points

70. Large-scale ecological tipping points, such as Amazon dieback, could overturn any REDD-plus efforts if overall GHG emissions are not significantly lowered and if deforestation is not sufficiently reduced overall. Several modelling scenarios suggest there is a significant risk that removal of as little as 20 per cent of the Amazon rainforest could push much of Amazonia into a permanently drier climate regime, and that passing such a tipping point becomes more likely with temperature increases of more than 2°C. Forest-related tipping points could create feedback loops within the climate system, by which the additional release of GHG from collapsing or changing forest ecosystems could further increase temperature, leading to further tipping points (SCBD, 2009; SCBD, 2010a; Leadley et al., 2010).

71. Therefore, the overall success of REDD-plus depends on its scale, which must be sufficient to ensure the resilience of the forests it targets, while its success depends at the same time on sufficient overall GHG reductions. The Ad Hoc Technical Expert Group on biodiversity and climate change suggested that deforestation of 35-40 per cent of the Amazon basin, especially in eastern Amazonia, could shift the forest into a permanently drier climate, increasing the risk of fire and carbon release (SCBD, 2009).

3.3 Risks to REDD-plus related to governance challenges

72. With reference to indigenous and local communities, REDD-plus is prone to governance failures at various levels. In part this is due to the general characteristic of the forest sector: Forests are often in remote areas far from regulatory institutions, the high value of timber and other forest products incentivizes rent-seeking behaviour both by state and corporate actors, and non-transparent forest decision making provides opportunities for corruption at all levels. Weak forest governance includes inappropriate forest law, weak law enforcement capacity, and perverse incentives, such as tax incentives for land clearing or subsidies to forest industry that support excessive harvest and forest conversion (Brown, 2010; Seymour & Forwand, 2010).

73. Risks to REDD-plus stemming from weak governance structures include the continuation of illegal logging (Kanninen et al., 2007), ineffective national REDD-plus finance distribution (Huettner, 2011), and insufficient buy-in and support by indigenous and local communities (see section 4.3 for a more extensive discussion of governance).

3.4 Risks to REDD-plus from lack of involvement of indigenous and local communities

74. A particular governance-related risk to REDD-plus stems from a potential lack of involvement of indigenous and local communities. The permanence of forest carbon stocks is at risk if indigenous and local communities are not fully and effectively involved in REDD-plus design and decision-making, and if they are excluded from an equitable distribution of benefits arising from REDD-plus.

75. Equity and the full and effective participation of indigenous and local communities is an enabling condition for REDD-plus, as its long-term success will depend on the buy-in and support by local forest users. In this context REDD-plus can draw on the extensive experience in forest management and conservation, where examples abound of failures to achieve management objectives, due to the lack of inclusion of local stakeholders, and subsequent local resistance (Peluso, 1992). At the same time, valuable lessons for REDD-plus may be learned from the many examples of successful forest management and conservation efforts that involve local communities (Ricketts et al., 2010).

Forest Resilience, Biodiversity, and REDD-plus

Resilience is the capacity of a forest to withstand (absorb) external pressures and return, over time, to its pre-disturbance state. When viewed over an appropriate time span, a resilient forest ecosystem is able to maintain its identity in terms of taxonomic composition, structure, ecological functions, and process rates. The available scientific evidence strongly supports the conclusion that resilience of a forest ecosystem to changing environmental conditions is determined by its biological and ecological resources, in particular (i) the diversity of species, including micro-organisms, (ii) the genetic variability within species (i.e., the diversity of genetic traits within populations of species), (iii) the landscape diversity; and (iv) the regional pool of species and ecosystems.

Maintaining or restoring biodiversity in forests promotes resistance to environmental change and is therefore an essential insurance policy and safeguard against expected climate change impacts, while increasing the biodiversity in planted and semi-natural forests will have a positive effect on their resilience and often on their productivity and the number of other services provided by the system.

Resilience is also influenced by the extent and intactness of forest ecosystems (generally, the larger and less fragmented the forest, the higher the resilience), and by the condition and characteristics of the surrounding landscape. A component of resilience is related to the capacity to resist invasion by alien species. Fragmented and degraded forests are more prone to invasion than intact fully functioning forests.

Primary forests are generally more resilient (and stable, resistant, and adaptive) than modified natural forests or plantations. Measures that promote their protection yield both biodiversity conservation and climate change mitigation benefits, in addition to a full array of ecosystem services. The total carbon pool is greatest in old primary forests, especially in the wet tropics, which are stable forest systems with high resilience and resistance.

The regional impacts of climate change, especially interacting with other land use pressures, might be sufficient to overcome the resilience of even some large areas of primary forests, pushing them into a permanently changed state. If forest ecosystems are pushed past an ecological tipping point, they could be transformed into a new non-forest ecosystem state (e.g., from forest to savannah). In most cases, the new ecosystem state would be poorer in terms of both biological diversity and for delivering ecosystem goods and services.

Plantations and modified natural forests will face greater disturbances and risks for large-scale losses due to climate change than primary forests because of their generally reduced biodiversity and low resilience. While it is relatively simple to plant trees and produce a short-term wood crop, the lack of diversity at all levels (i.e., gene, species of flora and fauna, and landscape) in these systems reduces resilience and resistance to disturbances, degrades the provision of goods and services that these modified systems can provide, and renders them vulnerable to catastrophic disturbance. The risks can partly be mitigated by adhering to a number of forest management recommendations, and by implementing sustainable forest management at a global scale:

- Maintain genetic diversity in forests by avoiding practices that select only certain trees for harvesting based on superior site, growth rate, or form.
- Maintain stand and landscape structural complexity, using natural forests and processes as models. Managers should try to emulate the natural stands, in terms of species composition and structure, by using silvicultural methods that relate to the major functional tree species.
- Maintain connectivity across forest landscapes by reducing fragmentation, recovering lost habitats (forest types), expanding protected area networks, and establishing ecological corridors.

- Maintain functional diversity and eliminate the conversion of diverse natural forests to monotypic or reduced-species plantations.
- Reduce non-natural competition by controlling invasive species and reduce reliance on non-native tree crop species for plantation, afforestation, or reforestation projects.
- Manage plantation and semi-natural forests in an ecologically sustainable way that recognizes and plans for predicted future climates. For example, reduce the odds of long-term failure by apportioning some areas of assisted regeneration for trees from regional provenances and from climates that approximate future climate conditions, based on climate modelling.
- Maintain biodiversity at all scales (stand, landscape, bioregional) and of all elements (genes, species, communities) by, for example, protecting tree populations that are isolated, disjunct, or at the margins of their distributions. These populations are most likely to represent pre-adapted gene pools for responding to climate change and could form core populations as conditions change.
- Ensure that there are national and regional networks of scientifically designed, comprehensive, adequate, and representative protected areas. Build these networks into national and regional planning for large-scale landscape connectivity.
- Develop an effectiveness monitoring plan that monitors climate conditions and results of post-harvest silvicultural actions, and adapt planning and implementation as necessary.

Source: Thompson et al. 2009

PART II: SEIZING OPPORTUNITIES FOR BIODIVERSITY AND REDD-PLUS

4. Key opportunities

4.1 Opportunities for in situ conservation of forest biodiversity

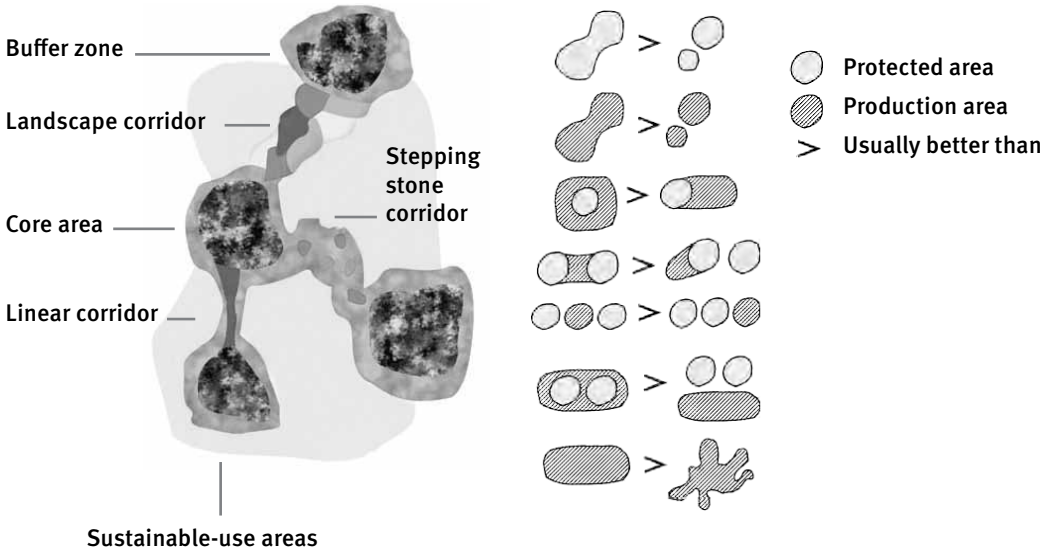
4.1.1 REDD-plus as an incentive to improve protected area management and provide connectivity between protected areas

76. Creating linkages between key habitats (ecological connectivity) will allow species to migrate and will contribute to healthy gene pools. In particular, in light of adaptation to climate change, improving ecological connectivity is a cornerstone of conservation policy (SCBD, 2009; Ervin et al., 2010). This can, for example, be achieved by integrating protected areas into the wider land- and seascape by reducing fragmentation of habitats, and by creating ecological corridors between habitats (see Figure 2).

77. According to UNFCCC COP decision 1/CP.16 the implementation of REDD-plus activities should be used to incentivize the protection and conservation of natural forests and their ecosystem services and promote and support transparent and effective national forest governance structures.

FIGURE 2

Ecological connectivity and different forms of landscape linkages



Sources: ITTO/IUCN, 2009; Bennett, 2004

4.1.2 REDD-plus as an opportunity to maximize co-benefits through protected areas

78. Protected areas are commonly thought to be the most straightforward and effective tool for land management to ensure biodiversity conservation. Systems of protected areas maintain key habitats, provide refuges, allow for species migration and movement, and ensure the maintenance of natural processes across the landscape. Protected areas also safeguard ecosystem services, provide employment and income opportunities nationally and locally, and serve as symbols which unite and forge nations (Brockington & Igoe, 2006).

79. However, protected areas were also severely criticized for the displacement of indigenous and local communities, which occurred both in the form of the forced removal of people from their homes and the exclusion of people from particular areas in their pursuit of a livelihood (Brockington & Igoe, 2006; Agrawal & Redford, 2009; van Oudenhoven et al., 2010). In reaction, delegates at the IUCN World Parks Congress in Durban in 2003 highlighted their commitment "to involve local communities, indigenous and mobile peoples in the creation, proclamation and management of protected areas." One of the major goals of the Action Plan negotiated at Durban was to ensure the rights of indigenous and local communities are secured in relation to natural resources and biodiversity conservation.

80. Significantly, the Durban World Parks Congress also recognized the validity of applying a variety of protected area governance structures to all IUCN categories of protected areas. The most distinctive of these has been decentralized natural resource governance, including community conserved areas (Borrini-Feyerabend et al., 2004). At their most extensive, these decentralized approaches to conservation have allowed indigenous and local communities to redefine ownership, use and management of natural resources. The outcomes of these efforts vary, but when effective they have increased the rights and benefits of indigenous and local communities in terms of natural resources (Agrawal & Ostrom, 2008) and provided opportunities for biodiversity conservation at reduced cost (Chazdon, 2008; Somanathan et al., 2009).

81. The CBD COP recognizes the importance of community conserved areas and their role in the diversity of governance types for protected areas. At its ninth meeting, in Bonn, Germany, in 2008, the Conference of the Parties to CBD invited Parties to "improve and, where necessary, diversify and strengthen protected-area governance types, leading to or in accordance with appropriate national legislation including recognizing and taking into account, where appropriate, indigenous, local and other community-based organizations" (para. 6 (a), decision IX/18).

82. In the same decision, Parties are invited to "recognize the contribution of, where appropriate, co-managed protected areas, private protected areas and indigenous and local community conserved areas within the national protected area system through acknowledgement in national legislation or other effective means" (para. 6 (b)).

83. Moreover, at its tenth meeting, held in Nagoya, Japan, in 2010, the Conference of the Parties adopted decision X/31 on protected areas wherein the COP invited Parties to (i) "establish clear mechanisms and processes for equitable cost and benefit-sharing and for full and effective participation of indigenous and local communities;" (ii) "recognize the role of indigenous and local community conserved areas and conserved areas of other stakeholders in biodiversity conservation, collaborative management and diversification of governance types possibly through national legislation;" and (iii) "diversify and strengthen protected-area governance types."

4.1.3 REDD-plus as an opportunity to achieve synergies between mitigation and adaptation

84. REDD-plus is first and foremost a climate change mitigation effort. However, deforestation and forest degradation are accompanied by the loss of numerous vital ecosystem services which provide a variety of income possibilities, material welfare, livelihoods, security, resilience, social relations, health, and freedom of choices and actions (MEA, 2005). These ecosystem services, and their continuous supply, are becoming increasingly important in the context of adaptation to climate change.

85. The new GEF sustainable forest management strategy for 2010-2014 (GEF-5) is based on the understanding that financial support to forest projects has to achieve multiple globally agreed environmental objectives, such as climate change mitigation, climate change adaptation, and biodiversity conservation.

Mitigation consists of activities that aim to reduce GHG emissions, directly or indirectly, by avoiding or capturing GHGs before they are emitted to the atmosphere or sequestering those already in the atmosphere by enhancing "sinks" such as forests. Such activities may entail, for example, changes to behavioral patterns or technological development and diffusion.

Adaptation is defined as adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects, that moderate harm or exploit beneficial opportunities.

(Source: IPCC 2001)

86. Adaptation in relation to forests broadly falls into two categories: *adaptation for forests*, i.e., adaptation which focuses on the management changes needed to increase the resistance and resilience of forests, and *forest for adaptation*, i.e., adaptation which targets the role that forests can play in helping societies adapt to climate change. It is important to consider both categories in the context of REDD-plus. Substantial synergies and cost savings can be realized by achieving mitigation and adaptation simultaneously, through coherent policies and measures, and because a lack of adaptation of forest management to climate change would endanger the permanence of the carbon stocks and thereby undermine the ultimate objective of REDD-plus.

87. The CBD AHTEG has compiled a list (Table 2) of examples of ecosystem-based approaches to adaptation in forests, which would also have biodiversity and mitigation benefits. All of these examples could, in principle, be financed under REDD-plus (SCBD, 2009).

Table 2: Examples of linkages between forest-based climate change mitigation and adaptation measures:

		Co-benefits			
Adaptation measure	**Adaptive function**	**Social and cultural**	**Economic**	**Biodiversity**	**Mitigation**
Mangrove conservation	Protection against storm surges, sea-level rise and coastal inundation	Provision of employment options (fisheries and prawn cultivation); Contribution to food security	Generation of income to local communities through marketing of mangrove products (fish, dyes, medicines)	Conservation of species that live or breed in mangroves	Conservation of carbon stocks, both above and below-ground
Forest conservation and sustainable forest management	Maintenance of nutrient and water flow; Prevention of land slides	Opportunities for: Recreation Culture protection of indigenous peoples and local communities	Potential generation of income through: Ecotourism, Recreation Sustainable logging	Conservation of habitat for forest plant and animal species	Conservation of carbon stocks; Reduction of emissions from deforestation degradation
Establishment of diverse agroforestry systems in agricultural land	Diversification of agricultural production to cope with changed climatic conditions	Contribution to food and fuel wood security	Generation of income from sale of timber, firewood and other products	Conservation of biodiversity in agricultural landscape	Carbon storage in both above and below-ground biomass and soils
Conservation of medicinal plants used by local and indigenous communities	Local medicines available for health problems resulting from climate change or habitat degradation, e.g., malaria, diarrhoea, cardiovascular problems.	Local communities have an independent and sustainable source of medicines Maintenance of local knowledge and traditions	Potential sources of income for local people	Enhanced medicinal plant conservation; Local and traditional knowledge recognized and protected.	Environmental services such as bees for pollination of cultivated crops

Source: Ad Hoc Technical Expert Group on Biodiversity and Climate Change (SCBD, October 2009)

4.1.4 The potential for forest landscape restoration

88. In a recent study, the World Resources Institute (WRI) and IUCN estimated the global potential for forest landscape restoration to be at 1 billion hectare, or the equivalent of about one quarter of all present forest area, but consisting of degraded areas both within forests and on deforested and degraded agricultural land (Global Partnership on Forest Landscape Restoration - GPFLR, 2010). WRI and IUCN identified the potential for forest landscape restoration in these degraded areas in two main categories: (i) Mosaic-type restoration, in more populated and higher-land-use areas with significantly reduced tree cover, and (ii) broad-scale restoration, in areas where the land-use pressure is low and forests can grow more freely (GPFLR, 2010).

89. This global estimate, which is presently being verified and further detailed in several pilot countries, illustrates the immense opportunity for forest landscape restoration. REDD-plus (in particular activities to enhance forest carbon stocks) could play an important role in tapping this potential. However, it is essential to consider biodiversity aspects of afforestation and reforestation, as well as the rights of indigenous and local communities when designing and implementing forest landscape restoration activities (see above).

4.2 Opportunities for improved forest management

4.2.1 Removal or mitigation of perverse incentives, and the promotion of positive incentives

REDD-plus is an opportunity to make progress towards sustainable forest management (SFM).

90. REDD-plus has the potential to address the fundamental market failure that drives most deforestation and forest conversion: that forests are worth more "dead (or as agricultural lands) than alive." The economic basis of this market failure was compiled by TEEB in order to address this issue. While some tradeoffs, in particular with agricultural land, might continue to be necessary, much of current deforestation and unsustainable forest management is driven or facilitated by the fact that the true costs of biodiversity and ecosystem loss, including deforestation, are invisible in current economic accounting, and the costs in terms of lost ecosystem services are carried by society at large (present and future), while the majority of short-term profits are usually realized by few individuals (TEEB, 2009b). REDD-plus is being developed as a form of payment for an ecosystem service (PES), and lessons learned from REDD-plus could potentially also facilitate the development or further success of other payments for ecosystem services from forests.

4.2.2 Progress towards sustainable forest management (SFM) through improved forest management practices

91. Sustainable forest management (SFM) has been recognized by the CBD COP as the key framework for the conservation and sustainable use of forest biodiversity, and can be seen as the application of the ecosystem approach in forests (decision VII/11). The Conference of the Parties has repeatedly urged Parties to implement SFM (decision IX/5). However, the application of the concept of SFM has remained elusive, partly because incentives, capacity and political will are lacking (SCBD, 2008b; Pistorius et al., 2010).

PHOTO: COURTESY OF CBD

92. REDD-plus could potentially trigger transformational change with regard to the implementation of SFM. The change needed in the forest sector to move significantly towards the implementation of SFM goes beyond the improvement of forest management techniques. The need for transformational change in the forest sector through the use of REDD-plus has been described in recent publications (e.g., The Forest Dialogue on Ghana REDD readiness, 2010, http://environment.yale.edu/tfd/).

93. One example of SFM implementation that could be improved with REDD-plus incentives is reduced impact logging (RIL). It has been estimated that the potential for emission reductions through improved forest management is at least 10 per cent of that obtainable by curbing tropical deforestation, and that RIL and other sustainable logging operations can result in reductions of up to 30 per cent of emissions from forest operations compared to business as usual (Putz et al., 2008). RIL and other sensitive logging techniques can also improve the impact of logging operations on biodiversity (Peña-Claros et al., 2008; Putz et al., 2008). REDD-plus might also further add to an emerging concept of managing forests for multipurpose values in addition to timber production. It is often possible to manage forests for biodiversity values and multiple ecosystem services (such as carbon storage, drinking water supply and recreation) at the same time, and without significant trade-offs, although often one management objective prevails.

Sustainable Forest Management

In December 2007 the UN General Assembly adopted the *non-legally binding instrument on all types of forests* (forest instrument). This instrument represents the first widely and inter-governmentally-agreed language on the meaning of SFM. It states that "sustainable forest management as a dynamic and evolving concept aims to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations."

It further specifies:

To achieve the purpose of the present instrument and taking into account national policies, priorities, conditions and available resources, Member States should:

(a) Develop, implement, publish and, as necessary, update national forest programs and other strategies for sustainable forest management which identify actions needed and contain measures, policies or specific goals, taking into account the relevant proposals for action of the Intergovernmental Panel on Forests / Intergovernmental Forum on Forests and resolutions of the United Nations on Forests;

(b) Consider the seven thematic elements of sustainable forest management which are drawn from the criteria identified by existing criteria and indicator processes, as a reference framework for sustainable forest management.

These elements are: (i) extent of forest resources; (ii) forest biological diversity; (iii) forest health and vitality; (iv) productive functions of forest resources; (v) protective functions of forest resources; (vi) socio-economic functions of forests; and (vii) legal, policy and institutional framework.

To further increase the positive impact of SFM, cautious harvesting techniques such as reduced-impact logging can be applied. They minimize the ecological damage caused by logging through the use of site-sensitive harvesting techniques (low-weighted machines, low-volume logging). Research undertaken at the Center for International Forestry Research (CIFOR) has shown that reduced impact logging methods can reduce impacts on soil from heavy logging machinery by 25 per cent, and can lead to a gain of as much as 50 per cent in the carbon storehouse benefits from the remaining vegetation.

The challenge is that the knowledge and capacity to manage forests for multi-purpose functions is often lacking, especially in developing countries (SCBD, 2008b).

4.3 Opportunities for improved forest governance

94. As outlined in Part I, improving forest governance is a pre-condition for REDD-plus to function effectively. It will be essential for the creation of a sense of ownership among local forest users and thus for ensuring the permanence of forest carbon stocks. In addition, improved forest governance is also an end in itself. REDD-plus provides a unique opportunity to address diverse forest governance issues, ranging from further curbing illegal logging and increasing the accountability of forest agencies, to the recognition of the particular identities, experiences and visions of indigenous and local communities (Agrawal et al., 2008; Lawson, 2010; Sikor et al., 2010; Seymour & Forwand, 2010).

95. REDD-plus carries the momentum to make forest agencies at all levels more transparent, accountable and inclusive. To seize this opportunity, the design of REDD-plus will have to include the use of procedures in decision-making and implementation that encourage public participation, democratic control over forests, and the conduct of local affairs in ways that involve the participation of indigenous and local communities (Ribot et al., 2008). While some of these procedures still need to be developed, others can be readily applied. Among them are procedures seeking free, prior and informed consent (FPIC), decentralization of forest management to elected local governments, and the participation of indigenous and local communities in the management of local forests. In this context, the UN-REDD Programme has begun elaborating how FPIC should be applied to its activities and in REDD-plus readiness preparation more broadly.

96. In addition, REDD-plus offers the chance to equitably distribute the benefits arising from the use of forest resources and services, including carbon sequestration and storage. The equitable distribution of those benefits may take the form of granting indigenous and local communities fair shares in logging receipts, profits from community-company partnerships, and payments from ecosystem services. Equitable distribution may also involve the clarification and/or redistribution of forest tenure to define or redefine the holders of rights to access and market forest products and ecosystem services. In the case of carbon, achieving an equitable distribution of benefits will require the clarification of carbon property rights, including the question whether those rights will be linked to forest tenure. It will also require the development of access and benefit-sharing mechanisms that reduce transaction costs (Katoomba Group et al., 2010).[1]

REDD-plus offers the change to equitably share the benefits from the use of forest resources.

97. Table 3 illustrates the diversity of conditions with regards to forest tenure that exists between tropical countries.

PHOTO: GOODSHOOT/THINKSTOCK

[1] Table 4 also underlines the need for REDD-plus to engage with the private sector as well as indigenous and local communities.

Table 3: Forest tenure distribution in selected REDD-plus pilot and demonstration countries (all figures expressed in millions of hectares)

Country	Public				Private			
	Administered by government		Designated for use by communities and indigenous peoples		Owned by communities and indigenous peoples		Owned by individuals and firms	
	2002	2008	2002	2008	2002	2008	2002	2008
Brazil	295.26	88.56	11.68	25.62	74.50	109.13	57.30	198.00
Congo, Dem. Rep. of	109.20	133.61	0.00	0.00	0.00	0.00	0.00	0.00
Indonesia	104.00	121.89	0.60	0.23	0.00	0.00	0.00	1.71
Peru	nd	42.43	8.40	2.86	2.25	12.62	nd	5.29
India	53.60	49.48	11.60	17.00	0.00	0.00	5.20	1.07
Sudan	40.60	64.68	0.80	2.82	0.00	0.00	0.00	0.05
Mexico	2.75	nd	0.00	0.00	44.00	38.71	8.30	nd
Colombia	36.46	33.23	0.00	0.00	24.50	27.50	0.00	0.00
Bolivia	28.20	22.88	16.60	19.52	2.80	9.04	5.40	1.10
Venezuela	49.51	47.70	0.00	0.00	0.00	0.00	0.00	0.00
Zambia	44.68	42.44	0.00	0.10	0.00	0.00	0.00	0.00
Tanzania	38.50	31.79	0.40	1.58	0.00	2.05	0.00	0.06
Argentina	5.70	nd	0.00	nd	0.00	nd	22.20	nd
Myanmar	34.55	32.18	0.00	0.04	0.00	0.00	0.00	0.00
Papua New Guinea	0.80	0.26	0.00	0.00	25.90	25.51	0.00	0.00
Central African Republic	22.90	22.76	0.00	0.00	0.00	0.00	0.00	0.00
Congo, Rep. of	22.06	22.01	0.00	0.48	0.00	0.00	0.00	0.00
Gabon	21.00	21.76	0.00	0.00	0.00	0.00	0.00	0.00
Cameroon	22.80	20.11	0.00	1.14	0.00	0.00	0.00	0.00
Mozambique	nd	17.26	nd	0.00	nd	2.00	nd	0.00
Subtotal (16 complete cases)	924.12	755.34	41.68	68.53	127.7	173.23	67.90	201.99
Total (all cases)	932.57	815.03	50.08	71.39	173.95	226.56	98.40	207.28

Source: adapted from Sunderlin et al., 2009

98. Last but not least, REDD-plus provides a unique opportunity to recognize the particular identities, experiences and visions of indigenous and local communities, which are often distinct from (and conflicting with) notions of the cultural mainstream (Sikor et al., 2010). The acknowledgement of social and cultural differences could help overcome stigmas attached to indigenous and local communities in many parts of the world and prevent the further loss of cultural diversity. To seize this opportunity, REDD-plus

REDD-plus provides an opportunity to recognize the particular experiences and visions of indigenous and local communities

PHOTO: COURTESY OF CBD

design and implementation will have to pay explicit attention to the cultural, social and economic identities of indigenous and local communities and their historical experiences of exclusion. They will also have to take into account the implications of transnational agreements on indigenous rights, such as the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), as well as landmark decisions of international human rights courts.

99. The CBD has recognized the opportunities provided by REDD-plus for improved forest governance. It held, in cooperation with other relevant organizations, a Global Indigenous Peoples Consultation on REDD in Baguio City, Philippines, in November 2008, and formed an Ad Hoc Technical Expert Group (AHTEG) on Biodiversity and Climate Change, which met twice between November 2008 and July 2009. The Baguio City Consultations and the ATHEG both elaborated key guidance on REDDplus governance (SCBD, 2008a; 2009). They concluded, *inter alia*, that:

(a) Addressing the underlying drivers of deforestation and forest degradation will require a variety of approaches to improve forest governance, including stricter enforcement of forest laws, land tenure reform, and sourcing commercial wood supplies from deforestation/afforestation projects rather than primary forest. If REDD-plus is to achieve significant and permanent emissions reductions, it will be important to provide incentives for REDD-plus to local forest users, including alternative sustainable livelihood options (e.g., employment, income and food security).

(b) The implementation of rights recognized in UNDRIP should guide all activities on REDD-plus and indigenous peoples. REDD-plus could provide potential benefits to forest-dwelling indigenous and local communities but a number of conditions are important for realizing these benefits. Indigenous and local communities are likely to benefit from REDD-plus where they own their lands, where there is the principle of free, prior and informed consent, and where their identities and cultural practices are recognized and they have space to participate in policy-making processes.

(c) There is a need for greater awareness and capacity-building for indigenous and local communities on biodiversity and climate change issues, so that these groups can take an active role in deciding how

Case study: Programa Socio Bosque

The Government of Ecuador has established in its National Development Plan the objective to reduce the current deforestation rate by 50%. To do so, the Government is implementing a new model of forestry governance. The central component of that model is the "Forest Partners Programme" ("Programa Socio Bosque" in Spanish), created in 2010.

With Socio Bosque, the Government of Ecuador provides an annual economic incentive per hectare of forest to individuals or indigenous communities who voluntarily decide to protect the native forest they own. This way, the Government intends to reduce logging and make programme participants active partners in the defence of the natural resources of the country while supporting sustainable development. Socio Bosque aims to protect 4 million hectares of native forest; reduce GHG emissions caused by deforestation (REDD); and improve the living conditions of 1 million people that are among the poorest of the country.

Forest Partners provides economic benefits in a direct and equitable manner to individuals or indigenous communities committed to conserving their forest. This way, the programme reconciles conservation and human well-being. By implementing the programme, Ecuador is proactively addressing global climate change.

(Source: http://www.ambiente.gob.ec)

to engage in REDD-plus activities. It is also important that indigenous peoples can exchange their knowledge and practices of biodiversity conservation and sustainable management among themselves and have the opportunity to raise general awareness of such practices. At the same time, Governments could benefit from indigenous and local communities' traditional knowledge and practices related to biodiversity and forest conservation and management.

4.4 Opportunities for improved monitoring and reporting of biodiversity benefits

4.4.1 Opportunities for forest biodiversity monitoring

100. The status and trends of forest biodiversity are important proxy indicators for forest degradation (Gardner, 2010) and the CBD Secretariat, CIFOR, and IUCN are leading on the development of biodiversity criteria and indicators within the CPF initiative, as part of a package to monitor forest degradation. The results of this work will be available by December 2011.

101. Developing country Parties aiming to undertake REDD-plus activities are requested to develop, among other things, a national forest monitoring system and a system for providing information on how the various safeguards listed in the COP decision are being addressed and respected throughout the implementation of REDD-plus activities (decision 1/CP.16). The UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) was requested by the COP in the same decision to develop a work programme, including on guidance for the system for providing information on how the safeguards are being addressed and respected throughout the implementation of REDD-plus activities.

102. The CBD Secretariat has been requested, in Decisions IX/5 and X/36, to further enhance streamlining forest-related reporting based on the Collaborative Partnership on Forests (CPF) Task Force on Streamlining Forest-related Reporting, and to investigate whether there are inadequacies in forest biodiversity reporting and monitoring, with the objective of further improving the biodiversity component of the Global Forest Resources Assessment and other relevant processes and initiatives.

4.4.2 Forest categories and definitions in the context of REDD-plus

103. It has been argued that the absence of a sufficiently differentiated definition of "forest" makes it difficult to monitor forest degradation, as well as changes between different forest types (from primary to other naturally regenerated forests, to forest plantations), for example because the minimum canopy cover is currently only 10 per cent in the most widely accepted forest definition (see below; Sasaki & Putz, 2009). The scientific community has recently called for an improvement of the definition of forests,[2] e.g., to raise the threshold of canopy cover to at least 40 per cent for forests to be considered under REDD-plus.

104. Tropical forest degradation is a major source of carbon emissions, reduces biodiversity, and often leads to further deforestation (Ahrend et al, 2010). However, forest degradation is difficult and potentially expensive to monitor because *inter alia* it requires a higher degree of "ground truthing" than deforestation, which is increasingly monitored using cost-effective remote sensing and GIS tools. Recognizing the need to both harmonize international definitions of forest degradation (see box), and to improve its cost-effective monitoring, the CPF has established a Working Group on Forest Degradation, which is expected to produce a final report by December 2011. Preliminary results are available at http://www.fao.org/forestry/cpf/forestdegradation/en/.

[2] E.g., in the declaration of Association of Tropical Biology and Conservation, in its Resolution of 21 June 2010:
http://www.tropicalbio.org/index.php?option=com_content&view=article&id=172:un-misleading-forest-definitions&catid=51:resolutions&Itemid=79

In the absence of other globally-agreed definitions, many international processes use the FAO definition of forests as a default (Global Forest Resources Assessment, 2010):

Forest	Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as "forest", spanning more than 0.5 hectares, with trees higher than 5 metres and a canopy cover of 5-10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.

UNFCCC forest definition (under the Kyoto Protocol / LULUCF):

"Forest" is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest (UNFCCC, decision 11/CP.7).

FAO lists the following categories of forests (Global Forest Resources Assessment, 2010):

Category	Definition
Primary forest	Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
Other naturally regenerated forest of introduced species (sub-category)	Other naturally regenerated forest where the trees are predominantly of introduced species.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.
Planted forest of introduced species (sub-category)	Planted forest, where the planted/seeded trees are predominantly of introduced species.

(Source: FAO, Global Forest Resources Assessment, 2010)

Forest degradation

UNEP/CBD: A degraded forest is a secondary forest that has lost, through human activities, the structure, function, species composition or productivity normally associated with a natural forest type expected on that site. Hence, a degraded forest delivers a reduced supply of goods and services from the given site and maintains only limited biological diversity. Biological diversity of degraded forests includes many non-tree components, which may dominate in the under-canopy vegetation.

IPCC: A direct human-induced loss of forest values (particularly carbon), likely to be characterized by a reduction of tree cover. Routine management from which crown cover will recover within the normal cycle of forest management operations is not included.

FAO: The long-term reduction of the overall potential supply of benefits from the forest, which includes carbon, wood, biodiversity and other goods and services.[1]

[1] Source: FAO 2006. Definitional Issues related to Reducing Emissions from Deforestation in Developing Countries. Forests and Climate Change Working Paper 5. FAO, Rome, Italy. As cited in: CPF – Strategic Framework on Climate Change (2009).

5. Tools

5.1 Lessons learned from safeguard approaches in the voluntary market, and in pilot and demonstration activities

5.1.1. Voluntary market experiences

105. The voluntary carbon market has several years of experience with REDD-plus related projects, mainly projects to reduce deforestation through conservation. These experiences can provide useful lessons for efforts under the UNFCCC and CBD to provide guidance on social and environmental safeguards. For example, through a project initiated in 1997 by The Nature Conservancy, 642,500 hectares of tropical forest adjacent to the Noel Kempff Mercado National Park in north-eastern Bolivia were incorporated into the park.[3] Experiences with this and similar projects have led to the development of standards for REDD-related voluntary carbon market projects with a focus on biodiversity and social safeguards. For example, the Climate, Community & Biodiversity Standards (CCB Standards) identify land-based carbon projects that deliver benefits for local communities and biodiversity as well as for climate change mitigation. They were first released in 2005 followed by a revised in a Second Edition in 2008 published by the Climate, Community & Biodiversity Alliance, a partnership of NGOs (www.climate-standards.org). Since 2009, the CCBA and CARE International have been facilitating the development of social and environmental standards for national level REDD+ programmes. The text box below provides more information on the REDD+ Social & Environmental Standards. The World Wide Fund for Nature (WWF) Germany has produced an 'Assessment Guide' for forest carbon standards, which provides an overview of minimum environmental and social criteria that different carbon standards should observe (WWF, 2010).

106. Significant experience which could inform the approach to REDD-plus safeguards, and the enhancement of benefits, also exists in the field of forest certification. The CBD has recognized, in Decision IX/5, the potential role of voluntary market-based certification schemes for the implementation of the expanded programme of work on forest biodiversity.

[3] Source: www.nature.org/ourinitiatives/habitats/forests/verification_of_emissions_reductions_from_avoided_deforestation_noel_kempf.pdf

107. For example, the Forest Stewardship Council (FSC) ratified Principles and Criteria (P&C) for responsible forest management in 1994. Today these P&C are recognised as the leading global forest management standard for maintaining biodiversity and ensuring forest peoples' rights. However, the P&C are only one cornerstone in the FSC architecture. Safeguarding of social rights and environmental values in the FSC context goes well beyond the P&C. In order to prevent the domination of particular interests over others and adequately consider less vocal concerns, a number of precautionary measures have been built into the FSC system: (i) a multi-stakeholder governance structure balancing economic, environmental and social interests as well as Northern versus Southern perspectives; (ii) consultative processes for standards development, including the local adaptation of the international P&C; (iii) involvement of local stakeholders in certification processes; (iv) third party verification of standard compliance and system for corrective actions based on accreditation oversight; and (v) transparency in certification decisions and a dispute resolution system where certification decisions can be challenged.

5.1.2. UN REDD Programme

108. The UN-REDD Programme is in the process of developing a set of social and environmental principles and criteria to assist countries address the risks and opportunities associated with REDD-plus. The purpose of the principles and criteria is to provide the UN-REDD Programme with a framework to ensure that its activities promote social & environmental benefits and reduce risks from REDD-plus. The principles and criteria are also meant to assist reviewers of national programmes to evaluate their potential social and environmental impacts, to support countries in operationalising the UNFCCC's guidance and safeguards, and to contribute to the development of guidance on systems to provide information on how safeguards are addressed and respected.

109. The set of principles includes two principles on social issues, one on policy coherence, and three on environmental issues. Principle 1 includes criteria to ensure that REDD-plus actions comply with standards of democratic governance. Principle 2 focuses on carefully assessing potential adverse impacts

REDD+ Social & Environmental Standards

Recognizing growing awareness at both international and national levels of the need for effective social and environmental safeguards, the REDD+ SES Initiative, facilitated by the Climate, Community & Biodiversity Alliance (CCBA) and CARE International is developing standards to support the design and implementation of government-led REDD+ programs that respect the rights of Indigenous Peoples and local communities and generate significant social and environmental benefits. The standards are designed for government-led REDD+ programs implemented at national or state/provincial/regional level and for all forms of fund-based or market-based financing. By providing a comprehensive framework of key issues to address with respect to the social and environmental performance of a REDD+ program, the standards provide guidance to assist with REDD+ design and also provide a mechanism for reporting on the social and environmental performance of REDD+ programs.

Components of the Standards

A set of eight principles provide the key objectives that define high social and environmental performance of REDD+ programs. For each principle, a series of criteria define the conditions that must be met related to processes, impacts and policies in order to deliver the principles. Indicators define the information needed to show that the criteria are met and are being developed in each country. While the principles and criteria apply across all countries, the indicators are tailored to the country context.

(Continued on next page)

Principles

1. Rights to lands, territories and resources are recognized and respected by the REDD+ program.
2. The benefits of the REDD+ program are shared equitably among all relevant rights holders and stakeholders.
3. The REDD+ program improves long-term livelihood, security and well-being of Indigenous Peoples and local communities with special attention to the most vulnerable people.
4. The REDD+ program contributes to broader sustainable development, respect and protection of human rights and good governance objectives.
5. The REDD+ program maintains and enhances biodiversity and ecosystem services.
6. All relevant rights holders and stakeholders participate fully and effectively in the REDD+ program.
7. All rights holders and stakeholders have timely access to appropriate and accurate information to enable informed decision making and good governance of the REDD+ program.
8. The REDD+ program complies with applicable local and national laws and international treaties, conventions and other instruments.

Monitoring, Reporting and Verification

The monitoring, reporting and verification process must balance participation and ownership by stakeholders with enhanced transparency and accountability while also encouraging improved performance. MRV processes are being developed in each country tailored to the country context while remaining consistent with the overall approach of the initiative.

Some examples:

Criteria	Framework for indicators
Principle 1: Rights to lands, territories and resources are recognized and respected by the program	
1.2 The REDD+ program recognizes and respects both statutory and customary rights to lands, territories and resources which Indigenous Peoples or local communities have traditionally owned, occupied or otherwise used or acquired.	1.2.1 The policies of the National REDD+ program include recognition of and respect for the customary rights of Indigenous Peoples and local communities. 1.2.2 Land-use plans including forest management plans in areas included in the REDD+ program recognize and respect customary and statutory rights of Indigenous Peoples and local communities. 1.2.3 The REDD+ program promotes securing statutory rights to lands, territories and resources which Indigenous Peoples or local communities have traditionally owned, occupied or otherwise used or acquired.
Principle 5: The REDD+ program maintains and enhances biodiversity and ecosystem services	
5.1 Biodiversity and ecosystem services potentially affected by the REDD+ program are maintained and enhanced.	5.1.1 Biodiversity and ecosystem services potentially affected by the REDD+ program are identified, prioritized and mapped at a scale and level of detail appropriate to each element/activity within the program. 5.1.2 The objectives of the REDD+ program include making a significant contribution to maintaining and enhancing biodiversity and ecosystem services. 5.1.3 The REDD+ program identifies and implements measures that aim to maintain and enhance the identified biodiversity and ecosystem service priorities potentially affected by the REDD+ program. 5.1.4 The REDD+ program does not lead to the conversion of natural forests or other areas that are important for maintaining and enhancing the identified biodiversity and ecosystem service priorities. 5.1.5 The REDD+ program generates additional resources to maintain and enhance biodiversity and ecosystem services.

Source: http://www.redd-standards.org

on stakeholders' livelihoods and mitigating these effects where appropriate. Principle 3 focuses on policy coherence, ensuring that the UN-REDD Programme contributes to a low-carbon, climate-resilient and environmentally sound development policy, consistent with commitments under international conventions and agreements. Principle 4 includes criteria to ensure the protection and conservation of natural forest. Principle 5 aims to ensure that REDD-plus increases benefits delivered through ecosystem services and biodiversity conservation. Finally, principle 6 focuses on minimising indirect adverse impacts on ecosystem services and biodiversity, for example minimising inter-ecosystem leakage.

110. The principles and criteria will undergo review and testing in 2011 and are expected to be finalized after UNFCCC COP 17. In the meantime, the UN-REDD Programme is also working on tools and guidelines to support their application.

5.1.3. Forest Carbon Partnership Facility

111. The Forest Carbon Partnership Facility requires safeguards to be applied in the 'readiness' and 'carbon fund' phases of REDD-plus. Section 3.1 (d) of the FCPF Charter provides for compliance with the World Bank's Operational Policies and Procedures. The World Bank's safeguard policies are designed to avoid, mitigate, or minimize adverse environmental and social impacts of projects supported by the Bank. The Bank will supervise the continued compliance of the Bank financed REDD-plus readiness activity with the Bank's safeguard policies throughout FCPF process. For REDD-plus, the most relevant World Bank policies are likely to be the policies on Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), Forests (OP/BP 4.36), Involuntary Resettlement (OP/BP 4.12), and Indigenous Peoples (OP/BP 4.10). These policies can be found at: http://go.worldbank.org/WTA1ODE7T0.

112. In addition, the FCPF adapted the application of safeguards for the 'readiness' phase for REDD-plus through the use of Strategic Environmental and Social Assessment (SESA). SESA allows for the incorporation of environmental and social concerns into national REDD-plus strategy process and ensures that the FCPF readiness activities comply with World Bank Policies during the strategic planning phase, considering that these strategic activities could have potentially far reaching impacts. A specific output of the SESA is the Environmental and Social Management Framework (ESMF). The ESMF is a framework to avoid and/or mitigate and manage potential risks of the REDD+ strategy options related to the adoption of future REDD-plus projects, activities, and policies. For the ESMF to ensure compliance with Bank's safeguard policies, it has to be consistent with the applicable World Bank safeguard policies, including the policy on Environmental Assessment and it is expected to contain sections addressing the requirements of other applicable policies.

5.2. Tools to maximize biodiversity benefits

5.2.1. Spatial biodiversity analyses

113. Spatial planning of REDD-plus efforts will play a key role in avoiding biodiversity risks and enhancing benefits. The main CBD analysis of the 2010 biodiversity target, the third Global Biodiversity Outlook, revealed that a more consistent and comprehensive planning framework for land use is needed to meet the objectives of the CBD, by ensuring that various land use demands can be fulfilled while at the same time ensuring conservation and sustainable use of biodiversity. For effective planning of REDD-plus efforts, spatially explicit information on biodiversity is required at least on:

(a) Areas of high biodiversity in forests;

(b) Areas of high biodiversity in other ecosystems, which might be impacted by leakage;

(c) Areas of high importance for ecological connectivity.

114. Several international and national databases with information on areas of high biodiversity are available, for example the Integrated Biodiversity Assessment Tool (IBAT), which provides information on key biodiversity areas by combining several global and national datasets.[4] However, the availability of data and the capacity to process it in geographic information systems (GIS) varies widely between REDD-plus pilot and demonstration countries. The protected areas gap analysis (see below), carried out in over 20 developing countries, can serve to improve REDD-plus planning.

5.2.2. Carbon and biodiversity calculator

115. Initial attempts have been undertaken to combine online tools for calculation of terrestrial carbon with an indication of biodiversity values in any given possible REDD-plus area, for example at www.carbon-biodiversity.net. While these tools are useful for a rapid and indicative assessment of carbon stocks in key biodiversity areas, they are not yet specific enough to provide detailed (e.g. landscape or site level) information on project planning. However, as data and information technology improve, the approach might merit further attention.

5.2.3. Protected areas gap analyses

116. Perhaps the most useful and readily available tool to enhance biodiversity benefits of national and regional level REDD-plus planning are the ecological gap analyses', or 'protected areas gap analyses' carried out in many developing countries under the auspices of the CBD.

117. The CBD programme of work on protected areas (PoWPA), adopted by the Conference of the Parties to CBD in decision VII/28, contains multiple objectives with time-bound targets. The overall goal is to complete ecologically representative networks of protected areas, and Parties were guided to begin by completing a gap analysis of their protected area systems with the full and effective participation of indigenous and local communities and relevant stakeholders by the end of 2006. Details of the protected area gap analysis process, including information on tools and case studies, are available in a guide developed by Parrish and Dudley.[5]

118. At present, several Parties have completed or have nearly completed gap analyses of their protected area systems (Table 4). Currently, UNDP GEF is supporting an ongoing gap analysis in 22 countries. Portions of these biomes, many high in carbon stocks and currently without protection, could be protected under REDD-plus.

119. This information is relevant in the context of REDD-plus because the ecological gap analysis can provide solid mapping data and tools for landscape-level planning efforts of REDD-plus actions in more than 20 countries, plus 20 more in preparation. Many of these countries are pilot countries within the Forest Carbon Partnership Facility (FCPF) and/or the UN REDD Programme.[6] Through their national gap analyses, countries have identified high priority sites (HiPs) to expand or improve protected area

[4] From the IBAT website (http://www.ibatforbusiness.org): "Sites are considered globally important if they are known to hold one or more globally threatened species, endemic species, globally significant concentrations or populations, significant examples of biological communities, or any combination of these features. These sites, known as Key Biodiversity Areas Areas, build upon the work of other initiatives -- such as BirdLife International's Important Bird Areas, PlantLife International's Important Plant Areas, IUCN's Important Sites for Freshwater Biodiversity and sites identified by the Alliance for Zero Extinction -- to map important sites for a wide range of critical biodiversity in marine, freshwater and terrestrial biomes. These datasets are drawn from the World Biodiversity Database (WBDB), managed by BirdLife International and Conservation International, which is informed by the IUCN Red List of Threatened Species™."

[5] Closing the Gap: http://www.cbd.int/doc/publications/cbd-ts-24.pdf.

[6] E.g., Bolivia, Chile, Colombia, Costa Rica, Guatemala, Indonesia, Madagascar, Mexico, Nicaragua, Panama, Papua New Guinea, Peru.

systems and networks (see Figure 3). Technology and capacity are already available in countries that have completed or are undergoing gap analysis of their protected areas. HiPs are proposed for protection based on rigorous analysis of multiple GIS data layers, including ecosystem characteristics. Relevant stakeholders have been involved in the national gap analysis. The identified areas are of high value for biodiversity and are important for the livelihoods of surrounding populations through the provision of ecosystem services. Protection of these areas under REDD-plus, or consideration of these areas as buffer zones and ecological corridors around and between protected areas could maximize biodiversity conservation, while also securing key ecosystem services such as provision of water, and supporting sustainable livelihoods.

120. However, the challenge in many countries, and at the regional and international level, is to make this information available, at the right time and in the appropriate format, to the relevant institutions and individuals involved in the design and planning of REDD-plus efforts.

Table 4. Status and contact for protected area gap analyses of selected countries.

Countries	Contact	Status	Gap Analysis link (if completed and provided)
Algeria	Nadia Chenouf chenoufnadia@yahoo.fr	Nearly completed	
Bahamas	Tamica J. Rahming trahming@bnt.bs	Completed	
Belize	Hannah St.Luce Martinez hannahstluce@yahoo.com	Completed	http://biological-diversity.info/Downloads/NPAPSP/NPAPSP_2005.pdf
Benin	Ferdinand Claude Kidjo fkidjo@yahoo.fr	Nearly completed	
Bolivia	Edwin Camacho ecamacho@sernap.gob.bo	Nearly completed	
Cape Verde	Sonia Indira Araujo soniaraujocv@gmail.com	Nearly completed	
Costa Rica	Marco Vinicio Araya marco.araya@sinac.go.cr	Completed	www.gruas.go.cr
Ecuador	Isabel Endara Guerrero iendara@ambiente.gov.ec	Completed	
Grenada	Augustus Thomas augmas007@yahoo.co.uk	Completed	http://www.oas.org/dsd/publications/Unit/oea51e/begin.htm
Guatemala	Raquel Sigüenza; Fernando Castro rsiguenza@conap.gob.gt; fercastro@conap.gob.gt	Completed	
Guinea	Maadjou Bah bahmaadjou@yahoo.fr	Nearly completed	
Honduras	Oscar Arias oscarhernanarias@yahoo.com	Completed	
Jamaica	Carla Gordon cgordon@nepa.gov.jm	Completed	http://www.jamaicachm.org.jm/Document/Jamaica%20NEGAR.pdf
Japan	Tetsuro Uesugi tetsuro_uesugi@env.go.jp	Nearly completed	
Liberia	Nathaniel T. Blama, Sr. natpolo2000@yahoo.com	Nearly completed	
Madagascar	Sahoby Ivy Randriamahaleo sahobyivyrandriamahaleo@yahoo.fr	Nearly completed	

Countries	Contact	Status	Gap Analysis link (if completed and provided)
Mexico	Arturo Peña Jimenez; Carlos Eduardo Muñoz Cortes arpena@conanp.gob.mx; cmunoz@conanp.gob.mx	Completed	http://www.conabio.gob.mx/gap/index.php/Portada
Nepal	Mr. Shiv Raj Bhatta shivabhatta@hotmail.com	Completed	
Peru	Luis Alfaro Lozano lalfaro@sernanp.gob.pe	Nearly completed	Análisis del Recubrimiento Ecológico del Sistema Nacional de Áreas Naturales Protegidas por el Estado (CDC-UNALM/TNC, 2006)
Saint Lucia	Lavinia Alexander lalexander@slunatrust.org	Completed	
St. Vincent and the Grenadines	Andrew Lockhart nationalparks@vincysurf.com	Completed	Workshop report http://www.protectedareas.info/upload/document/report_1st_gap_workshop_svg.pdf
Samoa	Niualuga Evaimalo niualuga.evaimalo@mnre.gov.ws	Nearly completed	
Swaziland	Wisdom M. Dlamini director@sntc.org.sz	Completed	http://www.sntc.org.sz/bcpd/reports/sppstudy.zip

Case study: The protected area gap analysis of Mexico[7]

121. Gap analyses for Mexican terrestrial protected area systems were completed by the National Commission of Mexico for Protected Areas (CONANP) in full partnership with the National Commission on Biodiversity of Mexico (CONABIO) and in consultation with NGOs and academia. Data were collected for the units of analysis (256 km^2, 100 km^2) by examining key elements of biodiversity (1450 elements), the criteria for conservation goals (goals of 5 to 99 per cent), factors of threat and pressure (19 layers of information), and by using the MARXAN optimization program. Figure 3 presents the overall evaluation.[8]

122. Several gap analyses were necessary at different scales, and an ecoregional analysis was needed in order to consider an effective network of protected areas. One example is within the state of Oaxaca (Fig. 4), in the Chimalapas region, the focus of the WWF Selva Zoque Program. An area of high biodiversity, it encompasses the largest expanse of well-conserved lowland humid tropical forest and cloud forest in northern Mesoamerica. Already identified as an extreme priority under the gap analysis, and threatened by deforestation, arguments under REDD-plus could further inform the selection process and provide additional support toward protecting the biodiversity, including the carbon stocks, of the region.

[7] Source: CBD Secretariat, 2009: The CBD PoWPA Gap Analysis: A tool to identify potential sites for action under REDD-plus.

[8] For more information, contact CBD protected area focal point: Dr. Ernesto Enkerlin-Hoeflich. E-Mail: enkerlin@conanp.gob.mx.

FIGURE 3

The overall gap assessment of Mexico's terrestrial "spaces and species"

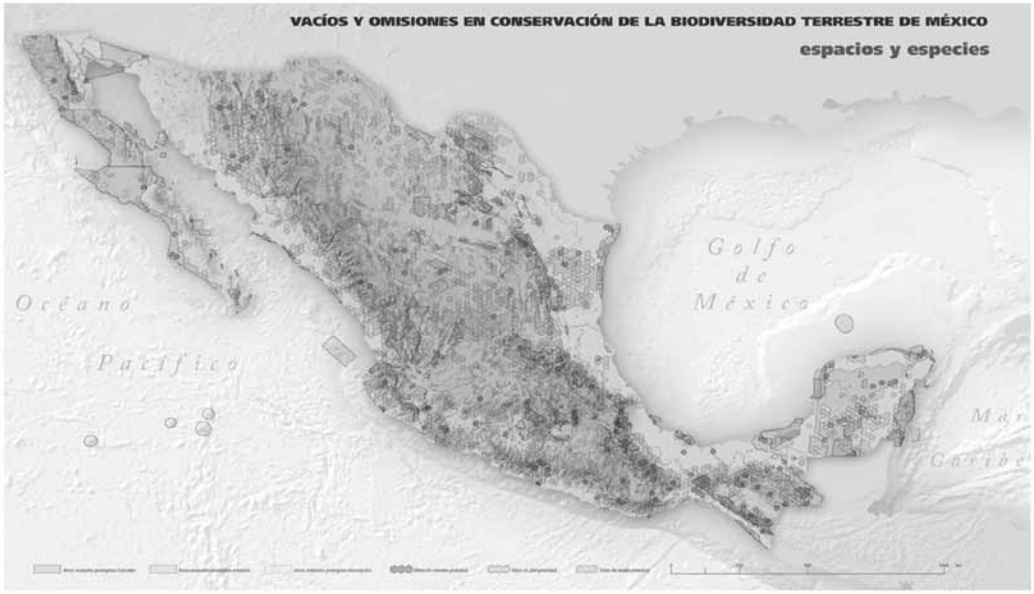
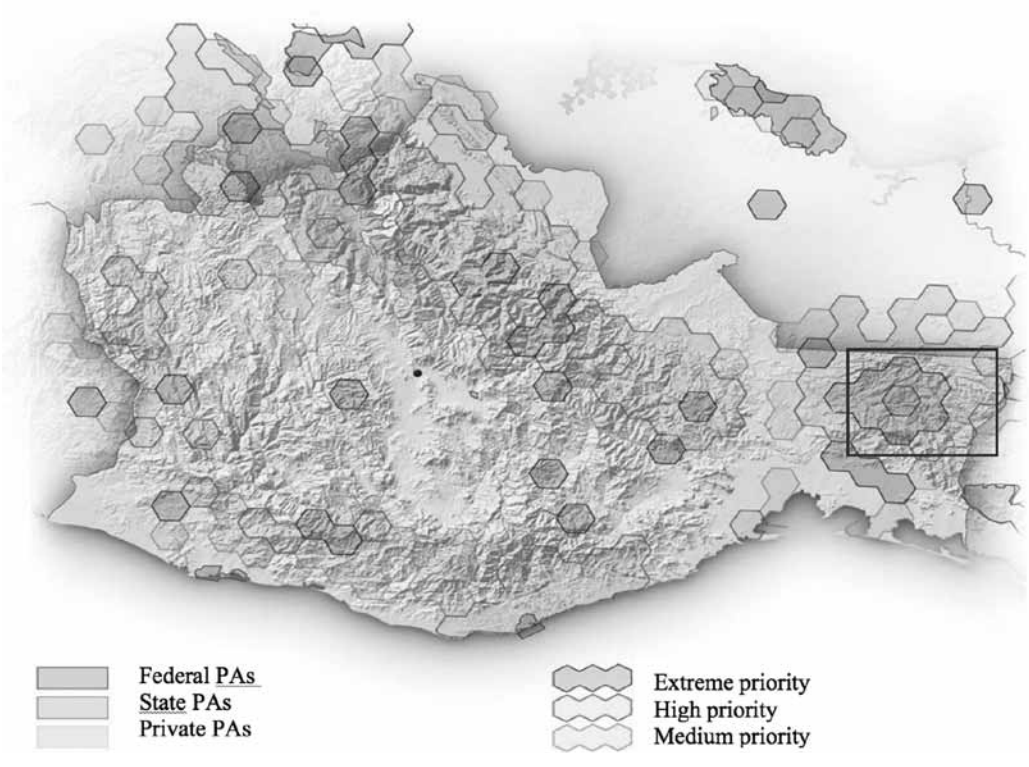


FIGURE 4

Protected areas vs. areas of priority in the state of Oaxaca, Mexico

The Chimalapas region is located inside the blue box. The assessment highlights opportunities for REDD-plus to prioritize high biodiversity areas, and also enhance ecological connectivity between existing protected areas.



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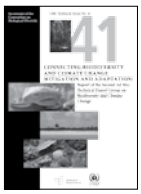

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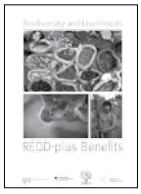

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All publications are available for download at: http://www.cbd.int/forest.
Copies can be ordered free of charge at secretariat@cbd.int.

Annex I

OUTCOMES OF THE GLOBAL EXPERT WORKSHOP ON BIODIVERSITY BENEFITS OF REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION IN DEVELOPING COUNTRIES

Nairobi 20-23 September, 2010

CO-CHAIRS SUMMARY

1. If REDD-plus[1] is successful at reducing deforestation and forest degradation, and promoting forest conservation, it will have significant and unprecedented benefits for biodiversity.

2. A well designed REDD-plus mechanism also has the potential to deliver significant benefits to indigenous peoples and local communities.

3. Both biodiversity and the full and effective participation of indigenous peoples and local communities are necessary for the success of REDD-plus. The permanent storage of carbon depends on well-functioning and resilient forest ecosystems, and on indigenous and local community participation and ownership.

4. Multiple benefits of REDD-plus, such as biodiversity benefits and benefits for indigenous peoples and local communities, are already being realized in many countries that are taking REDD-plus activities forward, e.g., through mapping exercises and through developing integrated REDD-plus national plans.

5. At this stage, the biggest risk to biodiversity and indigenous peoples and local communities from REDD-plus is that a well-designed REDD-plus mechanism is not agreed upon and successfully implemented.

6. Other specific risks for biodiversity identified by the meeting include:

(a) The conversion of natural forests to plantations and other land uses of low biodiversity value and low resilience; and the introduction of growing of biofuel crops;

(b) Displacement of deforestation and forest degradation to areas of lower carbon value and high biodiversity value;

(c) Increased pressure on non-forest ecosystems with high biodiversity value;

(d) Afforestation in areas of high biodiversity value.

7. Other specific risks of REDD-plus for indigenous peoples and local communities include:

(a) The loss of traditional territories and restriction of land and natural resource rights;

[1] In this report, REDD-plus refers to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. As negotiations under the UNFCCC are ongoing, acronyms within the co-chairs summary are used for the purpose of shortening the text, without any attempt to pre-empt or pre-judge ongoing or future negotiations under the United Nations Framework Convention on Climate Change (UNFCCC). The Plurinational State of Bolivia expressed its reservation to the use of the acronym REDD-plus in the co-chairs summary and refers to this mechanism as 'forest-related activities', considering that a) forests are not only important for emission reduction but they also have other multiple benefits as expressed in the co-chairs' summary and b) in accordance with CBD decision IX/5 the mandate for this workshop refers to reducing emissions from deforestation and forest degradation in developing countries.

(b) Lack of tangible livelihood benefits to indigenous peoples and local communities and lack of equitable benefit sharing;

(c) Exclusion from designing and implementation of policies and measures;

(d) Loss of traditional ecological knowledge.

8. Safeguards, if designed and implemented appropriately, will reduce the risks and enhance the potential benefits of REDD-plus, for example, by ensuring that conversion of natural forests is avoided, and ensuring full and effective participation of indigenous peoples and local communities based on the United Nations Declaration on the Rights of Indigenous Peoples, in particular the principle of free, prior and informed consent.

9. Action for multiple benefits needs to be taken at several levels. National governments play the key role in ensuring multiple benefits through the implementation of REDD-plus. National plans and national approaches benefit from the integration of climate change, biodiversity, and development objectives and strategies. This requires effective cross-sectoral coordination and harmonization of relevant policies and laws (agriculture, energy, environment, forests, biodiversity, and others), and integrated land-use planning at the national scale.

10. Successful implementation of REDD-plus is dependent on transparent and effective national governance structures.

11. The CBD can support the implementation of REDD-plus through its programmes of work and its biodiversity monitoring efforts, including by:

(a) Encouraging the Parties to maximize the benefits for biodiversity, for example, through prioritizing the conservation of natural forests;

(b) Supporting the work of the UNFCCC to operationalize safeguards;[2]

(c) Developing a framework for monitoring the impacts of REDD-plus on biodiversity.

12. Capacity-building efforts across all levels founded on comprehensive national self-capacity needs assessments, as well as information sharing, are needed in order to achieve multiple benefits of REDD-plus, including through coordinated efforts of the members of the Collaborative Partnership on Forests and other relevant organizations.

13. Identifying and realizing multiple benefits can be supported through the application of:

(a) Spatially-explicit tools, such as maps and ecological gap analyses, to identify synergies and tradeoffs among climate change, biodiversity, and social issues;

(b) The results of the The Economics of Ecosystems and Biodiversity (TEEB) process;

(c) Social and environmental standards for REDD-plus;

(d) The recommendations of the CBD second Ad Hoc Technical Expert Group on Biodiversity and Climate Change.[3]

[2] Without prejudging ongoing or future negotiations.

[3] CBD Technical Series 41: *Connecting Biodiversity and Climate Change Mitigation and Adaptation*, available at www.cbd.int/ts.

14. Key research and development needs in the context of REDD-plus multiple benefits include:

(a) Analysis of key drivers of biodiversity loss due to deforestation and forest degradation at the national and local level;

(b) The conditions for effective and equitable distribution mechanisms;

(c) Criteria and indicators for monitoring multiple benefits and safeguards;

(d) Spatially explicit support tools/maps, including information on ecosystem services;

(e) Socio-economic analyses of implementing REDD-plus considering the full value of forests and multiple benefits, recognizing that there are intrinsic values that cannot be expressed in terms of money;

(f) Reviewing and improving national biodiversity strategies and action plans (NBSAPs) to reflect climate change issues;

(g) Further collaborative work on the definitions on forests and forest types.

15. The workshop participants requested the Secretariat to make the workshop results available to the national focal points for the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change. To further advance the results of this meeting, the experts recommended that the CBD could explore possibilities for a technical workshop organized jointly by the CBD and UNFCCC Secretariat on how the CBD can support REDD-plus safeguards, without prejudice to the negotiations.

Annex II

Recommendations of the second CBD Ad Hoc Technical Expert Group (AHTEG) on biodiversity and climate change related to REDD[1]

The full version of the report, published in October 2009, is available at www.cbd.int/ts as CBD Technical Series nr 41 '*Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change*'. It includes the sources and references for the figures and statements cited below.

This annex is excerpt of section 3 of the report, which contains the REDD-related findings of the AHTEG.

SECTION 3: Biodiversity and Climate Change Mitigation[2]

130. This section examines the links between biodiversity and climate-change mitigation with a particular focus on land use management activities and reducing emissions from deforestation and forest degradation. The section explores the potential contribution of biodiversity conservation and sustainable use to mitigation efforts and suggests ways in which co-benefits can be enhanced. This section also examines the potential positive and negative impacts of mitigation activities on biodiversity while highlighting those mitigation approaches for which additional research is required.

3.1. Role of ecosystems in carbon storage and the carbon cycle

Conserving natural terrestrial and marine ecosystems and restoring degraded ecosystems can contribute to achieving several key objectives of both the UNFCCC and the Convention on Biological Diversity

131. **Well-functioning ecosystems are necessary to meet the objective of the UNFCCC because of their role in the global carbon cycle and their significant carbon stocks.** Carbon is stored and sequestered by biological and biophysical processes in ecosystems, which are underpinned by biodiversity. About 2,500 Gt C is stored in terrestrial ecosystems, compared to approximately 750Gt in the atmosphere. An additional ~ 38,000 Gt C is stored in the oceans (~37,000 Gt in deep oceans i.e. layers that will only feed back to atmospheric processes over very long time scales, ~ 1,000 Gt in the upper layer of oceans) (table 3.1). A large amount of the terrestrial carbon is stored in forest (about 1,150 Gt C) with around 30-40 per cent in vegetation and 60-70 per cent in soil. However, significant carbon stocks, especially soil carbon, is found in other terrestrial ecosystems including wetlands and peat lands; e.g., peat soil has been estimated to contain nearly 30 per cent of all global soil carbon whilst covering only 3 per cent of the land surface.

132. **Each year terrestrial ecosystems take up through photosynthesis and release through respiration, decay and burning approximately 60 Gt C so relatively small changes in the net exchange are important in the global carbon balance.** For example, during the 1990s it is estimated that while 6.4 ± 0.4 Gt C per year were emitted from combustion of fossil fuels, 0.52.7 Gt C per year were released by land-use activities (e.g., deforestation, land-use change and land degradation). However, another 0.9 to 4.3 Gt C per year was taken up by the residual land sink as a result of enhanced growth of terrestrial vegetation from CO_2 fertilization; additional nitrogen released by human activities and increased temperature. Marine ecosystems exchange even greater amounts of carbon with the atmosphere (about 90 Gt C per year) and on average store about 2.2 ± 0.4 Gt C per year. The rate of storage is controlled by two "pumps",

[1] CBD Technical Series No. 41, "Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change (www.cbd.int/ts/).

[2] The document largely uses the terms and definitions consistent with the UNFCCC decisions 1/CP.13 (Bali Action Plan and 2/CP.13 (REDD) without any attempt to pre-empt ongoing or forthcoming negotiations, or anticipate the outcome of these negotiations. The exception is when referring to terms that are defined differently under other international processes, or for which there is no general agreement of definition, in which case the use of the term is explained in the text.

one biological and the other physical, that transport carbon into the ocean depths. Physical processes control the rate at which CO_2 dissolves in the oceans, and both physical and biological processes then determine how the dissolved inorganic carbon is transported within the oceans. These processes are also being affected by climate change.

Table 3.1. ***One estimate of global carbon stocks in terrestrial ecosystems*** (There remains uncertainty around estimates of carbon stocks due to differences in field data used to calculate carbon densities and methods for up-scaling these values. There is also great variation within any biome, e.g., wet temperate forests can be 2-3 more carbon dense than the biome average.)

Biome	Global Carbon Stocks (Gt C)		
	Vegetation	Soil	Total
Tropical forests	212	216	428
Temperate forests	59	100	159
Boreal forests	88	471	559
Tropical savannas	66	264	330
Temperate grasslands	9	295	304
Deserts and semi deserts	8	191	199
Tundra	6	121	127
Wetlands	15	225	240
Croplands	3	128	131
Total	466	2 011	2 477

133. The widespread and accelerating degradation of ecosystems has been and remains a significant source of greenhouse gas emissions, and is reducing the potential of ecosystems to sequester carbon. Although the largest share of CO_2 emissions are as the result of the combustion of fossil fuels, in 2005 about 18% of annual global greenhouse gas emissions were attributable to deforestation and other land use change and an additional 5.1-6.1 Gt CO_2 eq., or 10-12% of global emissions, stemmed from agricultural land management practices (mostly through release of nitrous oxide (N_2O) and methane (CH_4)), although there is still uncertainty around the range of estimates. Degradation of natural grasslands, for example, can be a large source of carbon loss since cultivated soils generally contain 50-70 per cent less carbon than those in natural ecosystems. The continuing rapid loss and degradation of northern, temperate and tropical peatlands is also a major source of greenhouse gas emissions, with an estimated 3 Gt CO_2 eq. (or 10% of global emissions) released each year by the drainage and conversion of peatlands to agriculture or forestry, and peat fires.

134. **Given that forests contain almost half of all terrestrial carbon, continued deforestation and degradation at current rates would significantly hamper mitigation efforts.** An estimated 7 to 13 million ha of forests are cleared each year,[3] releasing about 1.5 Gt C (5.5 $GtCO_2$) into the atmosphere. In addition, 2 to 3 million hectares of tropical forests are degraded each year by unsustainable management. Reducing these emissions would make a key contribution to climate mitigation and is critical for avoiding dangerous climate change.

135. **There is a wide range of different forest contexts: from primary forests to monoculture plantations and these differ in their carbon stock, carbon sequestration potential, biodiversity value and their resilience to climate change.** Primary forests are generally more carbon dense and biologically

[3] Estimates of the area of deforestation vary according to methodology, definitions of what constitutes a forest and due to natural variation from year to year.

diverse than other forest ecosystems. Modified natural forests (i.e. those that have been logged or degraded through other land use activities) normally have lower carbon stocks and less biodiversity than primary forests. Plantation forests store and sequester carbon but, *inter alia*, stands are usually harvested at a young age and therefore the time-averaged stock is relatively smaller than the natural forest they replace. Also, they are less biologically diverse than the natural forests they replace. Among plantation types, those with diverse mixtures of native species have potential for more positive consequences for biodiversity than those comprised of monocultures or exotic species. Different forest areas could have similar carbon stocks and carbon uptake potential but differ in their biodiversity value (e.g., landscape situation, representativeness, degree of species endemism). Table 3.2 summarizes the contributions of different forest types to both mitigation of climate change and conservation and sustainable use of biodiversity.

Table 3.2. ***Total ecosystem carbon and biodiversity benefits of main forest contexts***[4]

Forest context*	Carbon stock	Carbon sequestration potential	Biodiversity	Value of ecosystem goods and services
Primary forest	+++	+**	+++	+++
Modified natural forest	++	++	++	++
Plantations*** (indigenous species)	+	+++ (depending on species used and management)	+(+)	+
Plantations (exotic species)	+	+++ (depending on species used and management)	+	(+)

* Forest definitions are a simplified version of FAO classification.

** Potential for additional sequestration depends on several elements.

*** Plantation forests store less carbon because stands are usually harvested at a relatively young age, and young trees store less carbon than older trees. Also, timber harvesting causes emissions from collateral damage to living and dead biomass and soil carbon. This is also why modified natural forests store less carbon than primary forests.

136. **Given the importance of ecosystems in the global carbon cycle, a portfolio of land use management activities, including reduced deforestation and forest degradation, in addition to stringent reductions in fossil fuel emissions of greenhouse gases, can play an important role in limiting increases in atmospheric greenhouse-gas concentrations and human-induced climate change.** The potential to reduce emissions and increase the sequestration of carbon from land use management activities is estimated to range from 0.5-4 $GtCO_2$-eq per year for forestry activities (REDD, afforestation, forest management, agroforestry), and 1-6 $GtCO_2$-eq per year for agricultural activities.[5] Achieving this potential, however, will be dependent upon the design and mode of implementation of these activities, and the extent to which they are supported and enabled by technology, financing and capacity building**.**

3.2. Forestry- related climate change mitigation opportunities and considerations

137. **There is a wide range of forestry-related mitigation options that could potentially also provide important biodiversity conservation benefits, including reducing emissions from deforestation and forest degradation, forest conservation, sustainable management of forests and enhancement of forest carbon stocks.**[6] **Such activities can also could potentially also provide important biodiversity conservation benefits,** though the extent to which they deliver these benefits will depend on how and where these activities are implemented (annex IV). The effect of different climate change mitigation options are also time dependent. For instance, reducing emissions from deforestation and forest degradation has an immediate effect whereas the mitigation effect of afforestation and reforestation will build through time.

[4] This table provides a general overview. Actual situations may vary depending on forest types and biomes, e.g., between boreal and tropical forestsz

[5] These estimates include models that assume effective prices ranging from <US$20/$tCO_2e$ to US$100/$tCO_2e$ in 2030.

[6] The document uses the terms and definitions consistent with the UNFCCC decisions 1/CP.13 (Bali Action Plan and 2/CP.13 (REDD) without any attempt to pre-empt ongoing or forthcoming negotiations, or anticipate the outcome of these negotiations.

138. **Opportunities for implementing forest-related climate-change-mitigation options will vary across different landscape contexts, depending on the land-use history, current land use activities and socioeconomic conditions.** Three broad types of landscapes can be identified (table 3.3) and a mixture of forest-related and agricultural options may be applicable in each of these landscapes:

(a) In forest landscapes subject to ongoing clearing and forest degradation, climate change mitigation and biodiversity conservation can be achieved by reducing deforestation and forest degradation and improving forest management;

(b) In forest landscapes that currently have little deforestation or forest degradation occurring, the conservation of existing primary forests is critical both for protecting carbon stocks and preventing future greenhouse emissions, as well as for conserving biodiversity;

(c) In forest landscapes that have already been largely cleared and degraded, climate change mitigation and biodiversity conservation can be achieved by enhancing carbon stocks through restoration and improved forest management, creating new carbon stocks (e.g., afforestation and reforestation), and improving agricultural management.

Table 3.3. ***Relevance of different climate change mitigation options to different landscape contexts***

	Landscape context		
Land use management and forestry-based climate change mitigation options	Landscapes where active deforestation and forest degradation are occurring	2. Landscapes where there is minimal or no deforestation and forest degradation	3. Landscapes which have largely been deforested
Reducing deforestation and forest degradation	X		
Forest conservation	X	X	
Sustainable management of forest carbon stocks	X		X (potentially applicable to remnant forest patches in landscape)
Afforestation, reforestation and forest restoration	X (on already-deforested or degraded land)		X
Implementation of sustainable cropland management	X (on deforested land)		X
Implementation of sustainable livestock management practices	X (on deforested land)		X
Implementation of agroforestry systems	X (on deforested or degraded land)		X
Conservation and restoration of peatlands, mangroves and other forested wetlands	X	X	X

139. The conservation of existing primary forests where there is currently little deforestation or forest degradation occurring, provides important opportunities for both protecting carbon stocks and preventing future greenhouse emissions, as well as for conserving biodiversity. Most of the biomass carbon in a primary forest is stored in older trees or the soil. Land-use activities that involve clearing and logging reduce the standing stock of biomass carbon, cause collateral losses from soil, litter and deadwood and have also been shown to reduce biodiversity and thus ecosystem resilience. This creates a carbon debt which can take decades to centuries to recover, depending on initial conditions and the intensity of land use. Conserving forests threatened by deforestation and forest degradation and thus avoiding potential future emissions from land use change is therefore an important climate change mitigation opportunity

for some countries. Avoiding potential future emissions from existing carbon stocks in forests, especially primary forests, can be achieved through a range of means including:

- Designating and expanding networks of protected areas,
- Establishing biological corridors that promote conservation in a coordinated way at large scales and across land tenures,
- Establishing payments for ecosystem services including carbon uptake and storage,
- Developing conservation agreements, easements and concessions,
- Providing incentives to compensate land owners, stewards and indigenous peoples on their traditional lands, for opportunity costs associated with forgoing certain kinds of development,
- Promoting forms of economic development that are compatible with conservation and sustainable use of biodiversity, and
- Adopting sound and effective technological and financial transfer mechanisms for conserving carbon stocks and biodiversity in those countries where forests still represent a significant asset.

140. **Addressing forest degradation is important because forest degradation leads to a loss of carbon and biodiversity, decreases forest resilience to fire and drought, and can lead to deforestation.** The definition of forest degradation is open to debate and can include unsustainable timber harvesting for commercial or subsistence use, in addition to other damaging processes such as fire and drought; all of which lead to reductions in carbon stocks and negatively impact biodiversity. Estimates of the extent of forest degradation are still uncertain, due to differences in the way in which forest degradation is defined and limited data availability. However, in some regions of the world, the area of logged and degraded forest is comparable to that deforested. For example, it is estimated that forest damage from logging in the Amazon results in a 15 per cent reduction in carbon stocks, and increased susceptibility to fire damage. At the same time, forest degradation generally threatens biodiversity by reducing habitat and the provision of ecosystem services.

141. **While protected areas are primarily designated for the purpose of biodiversity conservation, they have significant additional value in storing and sequestering carbon and potentially preventing future deforestation.** There are now more than 100,000 protected sites worldwide covering about 12 per cent of the Earth's land surface. Approximately 15 per cent of the terrestrial global carbon stock is currently under some degree of protection. The designation and effective management of new protected areas,[7] together with the improved management of the current protected-area network, could contribute significantly to climate-change-mitigation efforts. However, the extent to which protected areas are effective at conserving their carbon stocks depends on effective management, enforcement, and sustainable funding, especially in areas under anthropogenic pressure. The effectiveness of protected areas also depends on future climate change, due to their vulnerability.

142. **In forest landscapes currently subject to harvesting, clearing and/or degradation, climate change mitigation and biodiversity conservation and sustainable use can be best achieved by addressing the underlying drivers of deforestation and degradation, and improving the sustainable management of forests.** Sustainable forest management (SFM) refers to a tool kit of forestmanagement activities that emulate natural processes. These tools include planning for multiple values, planning at appropriate temporal and spatial scales, suitable rotation lengths, often decreasing logging intensities, and reduced impact logging that minimizes collateral damage to ground cover and soils. The application of internationally accepted principles of SFM in forests that are being degraded by current forestry practices can contribute to both climate change mitigation and biodiversity conservation and sustainable use goals, by enhancing carbon stocks and reducing greenhouse gas emissions. For example, a recent study demonstrated that improved management of tropical forest through reduced impact logging can reduce carbon emission

[7] The programme of work on protected areas under the Convention on Biological Diversity (decision VII/28, annex) encourages "the establishment of protected areas that benefit indigenous and local communities, including by respecting, preserving, and maintaining their traditional knowledge in accordance with Article 8 (j) and related provisions."

by approximately 30 per cent. Globally, it is estimated that the sustainable management of forests could reduce emissions by a total of about 6.6 Gt C by 2030, which is approximately 3 per cent of current emissions. However, especially in tropical forests, whilst such practices constitute a significant improvement on a "business as usual approach" they still result in depletion of *in situ* carbon stocks and increased emissions, along with reduced resilience and biodiversity loss, compared to an intact primary forest. If SFM practices are applied to previously intact primary forests, this could lead to increased carbon emissions and biodiversity loss, depending on the specific practices and the forest type.

143. **Reforestation can make a significant contribution to enhancing forest carbon stocks and biodiversity within landscapes that have been largely deforested and degraded, if the reforestation is designed and managed appropriately.** While reforestation with fastgrowing monocultures, often exotics, can yield high carbon sequestration rates and economic returns, this type of reforestation often has little value for biodiversity conservation. However, reforestation can provide both biodiversity and climate change mitigation benefits if it uses an appropriate mix of native species, incorporates any natural forest remnants, and results in a permanent, semi-natural forest. If appropriately designed and managed, reforestation activities on degraded lands can also relieve pressure on natural forests by supplying alternatives sources of sustainable wood products to local communities, thereby providing additional biodiversity and climate change mitigation benefits.

144. **Afforestation can have positive or negative effects on biodiversity, depending on the design and management.** Afforestation that converts non-forested landscapes with high biodiversity values (e.g., heath lands, native grasslands, savannas) and/or valuable ecosystem services (e.g., flood control) or increases threats to endemic biodiversity through habitat loss, fragmentation and the introduction of invasive alien species will have adverse impacts on biodiversity. However, afforestation activities can support biodiversity, if they convert only degraded land or ecosystems largely composed of invasive alien species; include native tree species; consist of diverse, multi-strata canopies; result in minimal disturbance, consider the invasiveness of non-native species, and are strategically located within the landscape to enhance connectivity.

3.3. Other (non-forest) land use management climate change mitigation options

Agriculture and other land use management activities on non-forested land can also make an important contribution to climate change mitigation and biodiversity conservation

145. **In addition to forest-based climate-change-mitigation options, there is a wide variety of activities in the agricultural sector which can maintain and potentially increase carbon stocks, while also contributing to the conservation and sustainable use of biodiversity**. Key examples of agricultural activities that can deliver multiple benefits, include conservation tillage and other means of sustainable cropland management, sustainable livestock management, agroforestry systems, reduction of drainage systems in organic agricultural soils, improved management of fertilizers, and maintenance or restoration of natural water sources and their flows including peatlands and other wetlands (see annex IV for further information). The restoration of degraded cropland soils, for example, may increase soil carbon storage and crop yields, while contributing to the conservation of agricultural biodiversity, including soil biodiversity. The global sequestration potential through increasing soil organic carbon via improved agricultural practices is estimated to be 1-6 Gt C/yr.

146. **Policies that integrate and promote the conservation and enhanced sequestration of soil carbon, including in peatlands and wetlands, can contribute to climate change mitigation and be beneficial for biodiversity and ecosystem services.** Peatlands and wetlands have very high carbon stocks, particularly below ground, with an average carbon sequestration value of almost 1400t C/ha. Globally, peat lands and wetlands harbour an estimated 550 Gt of carbon. Human disturbances, such as drainage for agriculture and forestry production or the use of fire, have transformed large areas of peatlands from being a sink

of carbon to a source. For example, tropical peat lands in South-east Asia emit 600 Mt CO_2 eq. per year (excluding peat fires). There is significant and cost-effective potential to reduce emissions from degraded peat land by restoring drained peat lands and preventing further fires and drainage in intact peat lands.

3.4. Enhancing the contribution of land-use management (including REDD) to biodiversity conservation

147. **Although forest and other landuse management climatechangemitigation activities can contribute to both climate change mitigation and biodiversity conservation and sustainable use, if designed and managed appropriately, the extent to which they deliver these benefits will depend on how and where these activities are implemented.** Annex IV outlines the potential benefits and risks to biodiversity from different forest and other landuse management climate change mitigation activities, and highlights potential means of increasing biodiversity benefits or reducing negative impacts. Reducing deforestation and forest degradation, and conserving moist tropical forests will have the greatest and most immediate impact on biodiversity conservation, as tropical forests host more than 60 per cent of the world's known species. However, all of these land-based climatechangemitigation activities can have positive impacts on biodiversity if they result in additional conservation or restoration of diverse, natural ecosystems, promote the sustainable use of native species, and maintain landscape connectivity, and if they avoid displacement of deforestation, forest degradation or land use change into other ecosystems. In addition, if climatechangemitigation strategies are implemented in areas of high biodiversity value (e.g., areas with high numbers of endemic or threatened species), the biodiversity benefits will likely be greater than if these activities are implemented in areas of lesser value.

148. **There may be some trade-offs between designing and managing activities for climate change mitigation and biodiversity conservation and sustainable use goals**. For example, the optimal age and species composition of plantation trees for wood supply may be different that that required to maximize biodiversity values or carbon storage. Similarly, the forest areas that may provide the largest, most immediate emissions reductions will not necessarily be those of greatest conservation value. In particular, some regions that currently have high forest cover may be of critical importance for biodiversity conservation, but of lower immediate importance for emissions reductions due to current low deforestation rates (e.g., the so-called, high-forest/low-deforestation countries).

3.5 Potential interactions between REDD and biodiversity

159. **In general, reducing deforestation and forest degradation (REDD) can result in positive consequences for biodiversity by protecting important forest habitat and maintaining landscape connectivity.** Tropical forests have extremely high levels of biodiversity, including areas with a high density of endemic species. The Amazon rainforest alone hosts about a quarter of the world's terrestrial species. However, if deforestation and forest degradation is simply displaced to other forest areas, or if it is shifted from an area of lower conservation value to one of higher conservation value, the biodiversity gains will be much reduced. Similarly, if deforestation and forest degradation is displaced to other native ecosystems-such as wetlands or savannahs, it could negatively impact the species native to these ecosystems.

160. **REDD also has the potential to contribute considerably to biodiversity conservation by allowing forest ecosystems to adapt naturally to climate change.** In order to enhance the contribution of REDD to adaptation, activities could be prioritized which minimize fragmentation, maximize resilience and aid in the maintenance of corridors and ecosystem services. This could be achieved in particular through maintaining connectivity of forest protected areas and other forests, at a landscape level.

161. **The exact impact of REDD on biodiversity will depend on its design and implementation, including its scope, carbon accounting methodology, monitoring and verification, and what strategies are implemented to reduce deforestation and forest degradation and promote more sustainable land**

management practices. There are several REDD design issues which will influence its potential to contribute to biodiversity conservation and sustainable use:

- **REDD methodologies based on assessments of only net deforestation rates could have negative impacts on biodiversity.** The use of net rather than gross deforestation rates[8] could obscure the loss of mature (i.e. primary and modified natural) forests by their replacement in situ or elsewhere with areas of new forest growth. This could be accompanied by significant losses of biodiversity as well as unrecorded emissions.
- **Addressing forest degradation is important because forest degradation may lead to the persistent loss of carbon and biodiversity, decreases forest resilience to fire and drought, and can lead to deforestation.** Monitoring to detect the severity and extent of forest degradation is therefore a key issue which needs further development.
- **Both intra-national and international leakage under REDD can have important consequences for both carbon and biodiversity and therefore needs to be prevented or minimized.**
- **Implementing REDD in areas identified as having both high biodiversity value and dense carbon stocks can provide especially important co-benefits for biodiversity and climate-change mitigation.** Several tools and methodologies are under development that could potentially be used to enhance the contribution of REDD to biodiversity. For example, existing information on critical forest areas for biodiversity conservation (e.g., critical bird areas, alliance for zero extinction sites, key biodiversity areas, and others) could be overlaid with information on deforestation rates and carbon stocks to determine which forests offer both the greatest climate change mitigation and biodiversity potential. The national gap analyses carried out by Parties under the Programme of Work on Protected Areas of the CBD could also be a valuable tool for identifying areas for the implementation of REDD schemes in forest areas that offer the greatest biodiversity co-benefits.

3.6. REDD and other land-use management activities, human livelihoods and indigenous peoples

While it is generally recognized that REDD and other land-use management activities could provide potential benefits, including critical ecosystem services , to forest-dwelling indigenous and local communities, a number of conditions are important for realizing these co-benefits

162. **The implementation of rights recognized in the United Nations Declaration on the Rights of Indigenous Peoples could be taken into account as a means of linking indigenous peoples' biodiversity-related practices to the potential benefits from REDD and other land management activities.** While it is generally recognized that REDD and other land use management activities could provide potential benefits, including critical ecosystem services, to forest-dwelling indigenous peoples and local communities (ILCs), a number of conditions are important for realizing these co-benefits. Indigenous peoples are likely to benefit from land use management climate change mitigation options where they own their lands, where there is the principle of free, prior and informed consent, and where their identities and cultural practices are recognized and they have space to participate in policy-making processes as outlined in table 3.5.

163. **There is a need for greater awareness and capacity building for indigenous peoples and local communities on biodiversity and climate change issues, so that these groups can take an active role in deciding how to engage in climate change mitigation activities.** It is also important that indigenous peoples can exchange their knowledge and practices of biodiversity conservation and sustainable management among themselves and have the opportunity to raise general awareness of such practices. At the same time, governments could benefit from indigenous peoples and local communities" traditional knowledge and practices related to biodiversity and forest conservation and management.

[8] Net deforestation (net loss of forest area) is defined in the FAO Global Forest Resources Assessment 2005 as overall deforestation minus changes in forest area due to forest planting, landscape restoration and natural expansion of forests.

164. **Addressing the underlying drivers of deforestation and forest degradation will require a variety of approaches.** Possible approaches include improved forest governance, stricter enforcement of forest laws, land tenure reform, forest management planning, providing incentives for REDD, expansion of protected areas, improved forest management, adoption of agroforestry to ensure fuelwood and timber access, the establishment of alternative livelihood activities, and sourcing commercial wood supplies from reforestation/afforestation projects rather than primary forest, among others. The selection of approaches to reduce deforestation and forest degradation depends on local, regional and national circumstances and include both economic and non-economic incentives and activities.

165. **If REDD is to achieve significant and permanent emissions reductions, it will be important to provide alternative sustainable livelihood options (including employment, income and food security) for those people, especially the rural poor who are currently amongst the agents of deforestation and forest degradation.** Specific livelihood options are most likely to be successful when they are tailored to specific social, economic and ecological contexts and consider sustainability under both current and projected future climate conditions.

Table 3.5. ***Overview of key issues for indigenous peoples and local communities (ILCs) related to biodiversity conservation and sustainable use and climate change mitigation***

Issue	Relevance to biodiversity conservation	Relevance to climate-change mitigation
Recognition of rights and generation of opportunities	Land tenure, access and benefit sharing, and participation in the decision-making process would give ILCs opportunities to manage and protect biodiversity on which they rely for their livelihoods and culture, and facilitates the distribution of benefits.	Promotion of alternative and sustainable production activities, which take into account local and indigenous knowledge and needs can reduce forest deforestation and forest degradation.
Awareness, capacity-building and dialogue	Need for awareness, capacity-building and knowledge exchange on biodiversity issues to ILCs. Governments could benefit from ILCs' traditional knowledge and practices related to biodiversity	Need for awareness, capacity=building and knowledge exchange on climate change issues to ILCs. Governments could benefit from ILC's traditional knowledge and practices related to climatic events (including adaptation).
Governance and equity	Free, prior and informed consent is important to the effective management of biodiversity by ILCs in so far as it facilitates decision making based on traditional structures, addresses the lack of law enforcement and poor forest management, and avoids perverse incentives.	Climate change mitigation strategies could take into account ILC processes or the possible negative impacts on ILCs. Free, prior and informed consent of ILCs could improve the effectiveness of REDD and other land management activities.
Policy and legislation	Policies and legislation developed with the effective participation of ILCs are more likely to be supported by them and contribute to biodiversity conservation. ILCs concept of forest management based on local and indigenous knowledge can contribute to the global and national debate on the conservation and sustainable use of forest biodiversity.	Policies and legislation developed with the effective participation of ILCs are more likely to be supported by them. ILCs concept of land and forest management based on local and indigenous knowledge can contribute to the global and national debate on REDD and other land management activities.
Gender	Women and elders hold valuable knowledge on forest biodiversity which should be safeguard and promoted with their prior informed consent.	Women and elders hold valuable knowledge on climate change impacts in forests and possible response activities which should be safeguarded and promoted with their prior informed consent.

NOTES

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